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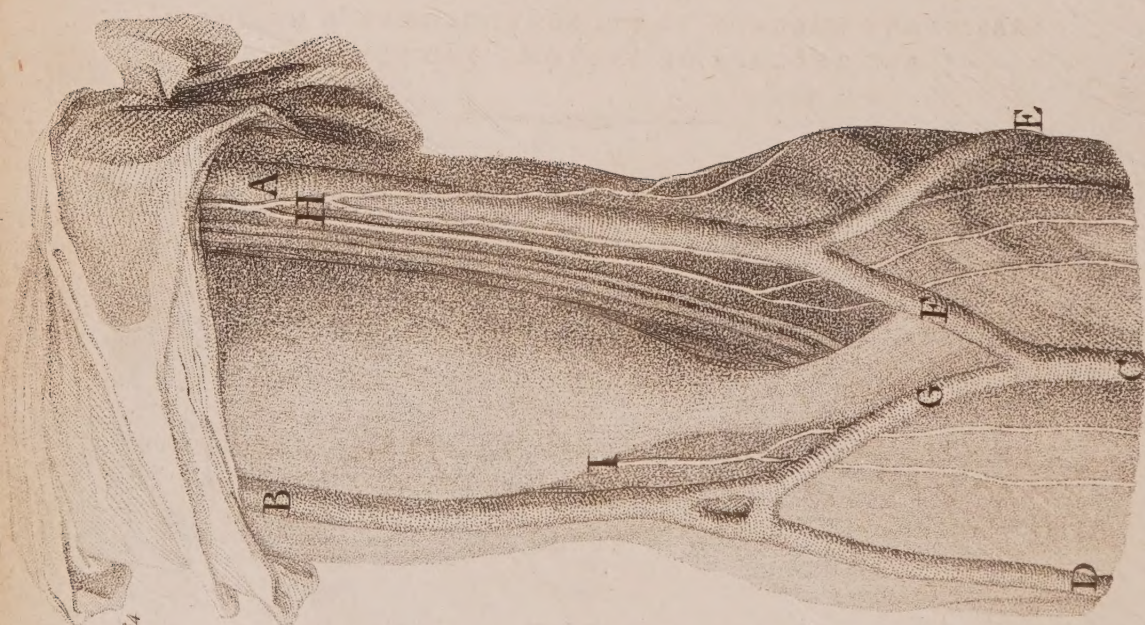
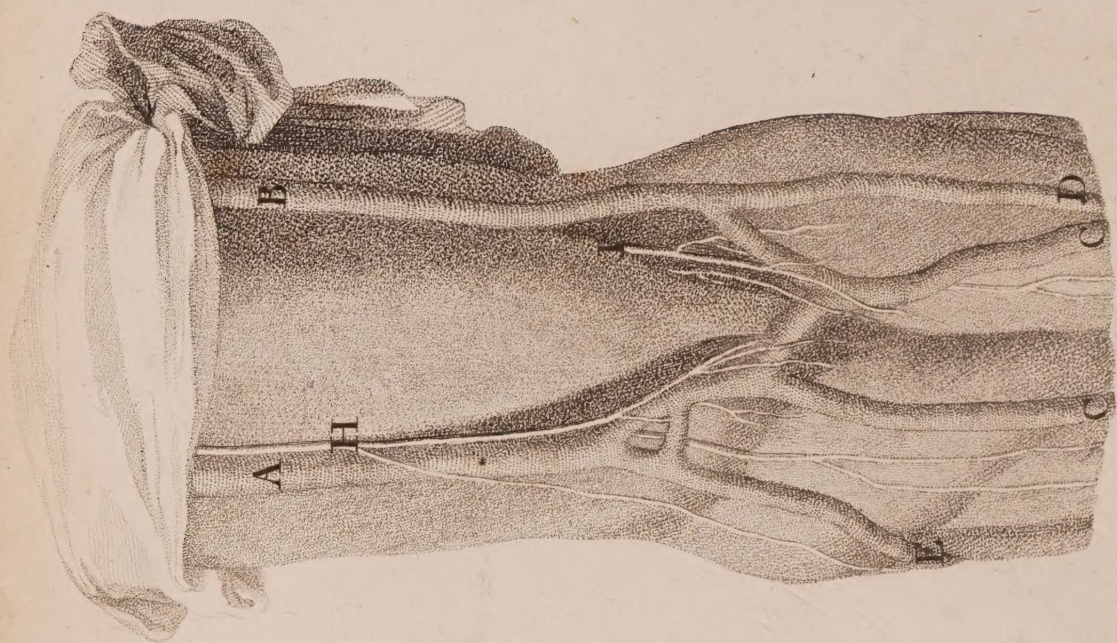














# SURGICAL OBSERVATIONS



ON

INJURIES OF THE HEAD;

AND ON

MISCELLANEOUS SUBJECTS.

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SURGICAL OBSERVATIONS

INJURY OF THE HEAD

MISCELLANEOUS SUBJECTS





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# SURGICAL OBSERVATIONS.

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## ON INJURIES OF THE HEAD.

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### SECTION I.

**W**HEN the Members of the Academy of Surgery in France, and Mr. Pott in England, severally inculcated to the surgeons of their respective countries, the propriety and necessity of trephining the cranium under various circumstances consequent upon injuries of the head, they probably recommended a too free and frequent performance of that operation. Such appears to be the opinion of many respectable writers who have published since their time; particularly of M. Default of Paris, Mr. Dease of Dublin, and Mr. John Bell of Edinburgh. But although

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though these writers unite in censuring the frequency of the practice, they are very far from being agreed in other respects; and many material points seem to me to require still further elucidation.

Believing that the observations, which I have had an opportunity of making at St. Bartholomew's Hospital, enable me to throw some light on this important and intricate subject, I am induced to submit to the public a short account of several cases that occurred there, and the inferences which I drew from them.

The difficulties connected with this part of surgery are sufficiently proved by this circumstance, that, notwithstanding it has at all times excited the attention of surgeons of the greatest talents, and possessing the most extensive field for observation, much difference of opinion still subsists, and the practice that ought to be followed in particular cases yet remains a matter of dispute. It is not, indeed, probable, that any part of medical science



science can in a short time receive all the improvement of which it is capable; for, in proportion as we advance in knowledge, we are led to remark many circumstances in the progress of a disorder, which had before passed without notice, but which, if known and duly attended to, would clearly point out to us the nature and remedy of the complaint. Hence, the records of former cases are of much less value, as the symptoms about which we are now anxious to inquire, have in them been entirely overlooked.

I was led to this remark by reading the Works of Hildanus, Wepfer, Du Quesnay, and others, wherein are to be found a number of interesting cases, which I have been precluded from mentioning, as the nature of them cannot be exactly ascertained in consequence of this deficiency.

Although I have been for many years attentive to the treatment of persons who had suffered injuries of the head, and also to the examination of the parts after death, where the case has terminated fatally; I still perceive

so many circumstances which require investigation, that I entertain no hope of ever being able to obtain, from my own experience, all the information which is wanted. I hope, however, that the hints offered in this Essay may have the effect of inducing surgeons to pay a closer attention to cases of this kind, and that thus, by their united observations, the public may at length become possessed of that knowledge, which the labours of an individual could never supply.

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In the accounts which we have of the former practice in France, it is related, that surgeons made numerous perforations along the whole track of a fracture of the cranium; and, as far as I am able to judge, without any very clear design. Mr. Pott also advises such an operation, even with a view to prevent the inflammation and suppuration of the *dura mater*, which he so much apprehended. But many cases have occurred of late, where, even in fractures with depression, the patients have done well without an operation.



tion. To confirm the accounts that have been given of such cases, and by this means to counteract, in some degree, the bias which long accustomed modes of thinking and acting are apt to impress on the minds of practitioners, I shall relate the histories of five cases, that occurred at St. Bartholomew's Hospital in the space of twelve months; and afterwards offer a few remarks upon the subject. The principal circumstances only of each case are related; for, as many examples of the same kind are to be found in various surgical books, a minute detail of particulars seem to be unnecessary.

*Cases of Fracture of the Cranium with Depression, which terminated favourably, although no Operation was performed,*

#### CASE I.

A woman, about forty years of age, was admitted into the hospital for a wound on her head. About a week before she applied for advice her husband had knocked her down with a brass candlestick. She was stunned by

the blow, and lay for some time senseless; but, on recovering, she felt no other inconvenience than the foreness occasioned by the wounded integuments. She had suffered some slight indisposition since the accident.

On examining the head, the right parietal bone was found denuded about two inches in extent; a fracture of the same length was also to be felt; and the bone on one side of the fracture was depressed about the eighth of an inch. — She remained in the hospital a fortnight, without any bad symptom occurring, and was then, at her own desire, discharged, although the wound was not perfectly healed.

#### CASE II.

A boy, about twelve years old, received a kick from a horse in Smithfield, which stunned him; and he was immediately brought to the hospital. The integuments of the forehead were divided by the injury, and the lower part of the os frontis, and superciliary ridge of the frontal bone depressed at least a quarter of an inch below its original level;



level; the depressed portion measuring about an inch and a half in length.

It is obvious that the bone could not be thus depressed without a fracture of some part of the basis of the skull occurring at the same time, on which account the case might be considered as more dangerous. — In less than two hours he had recovered from the immediate effect of the blow, being at that time perfectly sensible. Fourteen ounces of blood were taken from his arm; his bowels were emptied by a purge; and saline medicines, with antimonials, were directed to be given. He went on tolerably well for two days, at the end of which time, evident symptoms of considerable irritation of the brain took place. He now complained of pain in his head; slept little; and, when dozing, often started, or was convulsed in a slight degree. To remove these symptoms, he was bled twice, took opening medicines occasionally, was kept quiet, and without light, and was allowed only a spare diet. By continuing this plan for about three weeks, he perfectly recovered.

## CASE III.

A man between thirty and forty years of age, received a blow on the forehead from a brick thrown at him, by which the frontal bone was fractured about half an inch above the orbit: the fracture measured two inches in length, and the upper portion of the bone was depressed about the eighth of an inch. He was not even stunned by the blow, and walked to the hospital without assistance, complaining only of soreness in the wounded integuments. Sixteen ounces of blood were immediately taken from his arm; he was confined (much against his inclination) to a scanty and liquid diet, and was purged every second day. — This patient did not experience any illness; and the wound soon healed.

## CASE IV.

A boy, about thirteen years old, had a fracture, with depression, of part of the temporal and parietal bones. By similar treatment, he also escaped without any material ill consequences; but in this case, part of the injured bone exfoliated.

CASE



## CASE V.

A girl, thirteen years old, had a considerable fracture, with depression, of the left parietal bone. She was not brought to the hospital until ten days after the accident. When admitted, she was feverish, had pain in her head, and the little sleep she got was very much disturbed: but, by the use of bleeding, with antiphlogistic medicines and regimen, she soon got perfectly well.

The cases above related are not offered to notice on account of any striking peculiarity attending them, but merely to shew that such are not unfrequent, as they all occurred within the course of a year. From amongst a great number of similar cases, I shall select the two following, as the symptoms attending them were more violent than ordinary.

## CASE VI.

A lad, seventeen years of age, had his head pressed between a cart-wheel and a post; by which accident the scalp on both sides was turned downwards, so as to expose the lower  
half

half of the parietal bones, the squamous part of the temporal, and also part of the frontal and occipital bones ; about a quarter of the cranium being thus completely denuded. The periosteum was in several places stript off from the skull, the scalp much bruised, and the posterior and inferior angle of the left parietal bone was beaten in. The visible part of the depressed portion was an inch in length, and more than an eighth of an inch below the level of the cranium ; but the fracture extended along the squamous part of the temporal bone towards the basis of the skull : it could not, however, be traced, as the temporal muscle had not been removed from that part by the injury.— The scalp being cleansed was replaced, retained in its situation by slips of sticking-plaster, and a slight pressure by bandage was applied. The boy was perfectly sensible, his pulse regular, and not quickened. He had bled considerably from the temporal artery, which had been divided by the accident : eight ounces of blood were, however, taken from his arm ; and some purging medicine was administered next morning, which procured three or four stools.



stools. — The next day (*Friday*), his pulse beat nearly 120 in a minute; his skin was hot and dry; and he complained of pain in his forehead. Twelve ounces of blood were taken away, and four grains of pulvis antimonialis ordered to be given three times a day. On *Saturday*, the former symptoms still continued, and were rather increased. The antimonial powder made him sick, or at least increased his disposition to be so. Fourteen ounces more of blood were taken from him; the vibratory feel of his pulse not being altered until that quantity was taken away: the blood, on standing, appeared very buffy. His skin, notwithstanding all this, still remained extremely dry; some antimonial wine was given, which produced vomiting. On *Sunday*, his pulse was evidently lowered by the evacuations he had undergone, but it was still quick, and sufficiently strong. The pain of the head remained as before. Having a sufficient number of stools, and the sickness still continuing, the antimonial powder was omitted. He was bled, however, in the vena saphena, and his feet and legs were afterwards immersed in warm water; during which,

which, he, for the first time, perspired copiously. A blister was also applied to his neck. — The scalp united, with only a trifling suppuration over the fractured part of the bone; and to this ready union, the lowering plan, by preventing inflammation, seems very materially to have contributed. The matter collected over the fracture was discharged by a puncture, and the boy got well.

#### CASE VII.

A lad, eighteen years of age, had the squamous part of the temporal bone beaten in; the fracture ran horizontally, about a quarter of an inch above the zygoma, and could be distinctly traced with the finger, introduced through the torn scalp and temporal muscle, for two inches. The upper part of the bone was depressed about one-eighth of an inch; and it was impossible to trephine below the fracture in order to elevate the depressed portion. The lad had recovered from the immediate stunning occasioned by the injury; nor was there any symptom that indicated material derangement of the functions of the brain from the pressure which it sustained.

He



He was bled largely, and took a purging medicine, and was moderately well on the following day. On the second morning he was again purged; and when I saw him at noon nothing materially wrong appeared; but when I came to the hospital at eight in the evening I found he had gradually become delirious, and that he then could scarcely be kept in bed. His skin was hot, and his pulse frequent and strong. These symptoms could be attributed to nothing but inflammation of the brain; he was therefore immediately and largely bled. He now became quiet and manageable; but the next morning his replies to all questions were incoherent, his pulse frequent, his skin hot, and his tongue dry. The bleeding and purging were repeated, and at night a blister was applied to his neck. On the following morning he was sleeping and feeble, but his answers were rational; as the frequency and fulness of his pulse increased in the evening, he was again bled. The inflammation of the brain was now subdued, and the patient gradually recovered. The wound healed without any exfoliation of bone, and when he was discharged

charged from the hospital there was not the most trivial circumstance which could induce us to suspect that the brain had sustained any injury from the accident. His sleep was found and undisturbed, and the sudden motion of his head in any direction occasioned no giddiness or inconvenience.

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It appears very clearly, I think, from these cases, as well as from a great number of others to be found in books, that a slight degree of pressure does not derange the functions of the brain, for a limited time after its application. That it does not do so at first is very obvious ; as persons are often perfectly sensible, and free from head-ach and giddiness immediately after the injury. Whether it may not produce such an effect at some remote period, is not so easily determined, since this cannot be ascertained but by a continued acquaintance with the persons who had received the injuries. All, however, whom I have had an opportunity of knowing for any length of time after the accident, continued as well as if nothing of the kind had ever happened to them.



In Mr. Hill's Cases in Surgery, two instances of this sort are related; and Mr. Hill knew both the patients for many years afterwards, yet did not perceive any inconvenience to arise. It deserves to be mentioned too, that one of the patients was a sailor, and therefore, probably, led a life of irregularity as well as of exertion. The result of cases of this kind, which I have met with in authors, does not lead to the apprehension of any future mischief: nor is it easy to conceive that the pressure, which caused no ill effects at a time when the contents of the cranium filled its cavity completely, should afterwards prove injurious when they have adapted themselves to its altered size and shape. Severe illness, indeed, does often intervene between the receipt of the injury and the time of its recovery; and many surgeons might be inclined to attribute this to pressure; but it equally occurs where the depressed portion is elevated; several instances of which I shall have occasion to relate, and many others are to be met with in authors. This is a circumstance which nothing but very extensive experience can shew in a true light.

If,

If, for instance, a surgeon who was prepossessed with the opinion that elevation of the bone is necessary in every instance of depressed cranium, should have acted upon this opinion in the first, third, fourth, and fifth cases, and afterwards have employed proper evacuations, his patients might, perhaps, have had no bad symptoms, and he would naturally have attributed their well-doing to the mode of treatment which he had pursued: yet these cases did equally well without an operation. If the same surgeon had been witness to the disturbance which arose in the second, sixth, and seventh cases, he would, without doubt, have attributed them to the continuance of pressure made by the bone; yet these cases also did well by medical treatment only: and when the symptoms which come on thus, are of the inflammatory kind, they may generally be removed by the same means. Many cases also are to be met with in books, and some are related in the subsequent part of this Essay, where not only great but even fatal mischief ensued, notwithstanding the brain had been relieved from pressure at an early period. Another surgeon,



prejudiced against the use of the trephine, might, with equal injustice, consider the mischief, which ensues in certain cases, as entirely owing to the operation.

The degree of pressure, which the brain can sustain without great injury to the system, may probably vary according to the disposition of that organ to be affected by it, the suddenness of its application, and the direction in which it is made: and although it must be very difficult to obtain any precise knowledge on this subject, yet there is great reason to believe that the brain can bear more pressure without injury to it, than was formerly supposed. The first of these circumstances seems evident; for in some persons a slight pressure produces severe symptoms; whilst, in others, a much greater degree is borne without inconvenience. We can rarely judge of the effects of pressure when any part of the cranium is beaten in by a blow; for in that case the shock generally occasions stupefaction. Internal hæmorrhages, perhaps, afford us the best criterion whereby to determine the effects of pressure on the brain. The

eighth case will serve as an illustration of this remark, where it appears that a considerable hæmorrhage must have taken place before it deprived the patient of his faculties; for he walked home, undressed himself, and went to bed, after the trunk of the middle artery of the dura mater had been ruptured. In cases of apoplexy also, the hæmorrhage is generally very large before it produces those consequences which destroy life.

The authorities quoted by Morgagni, as well as his own observations, shew that people may recover from apoplexy even after a considerable effusion of blood has taken place. But as the records of such cases are not common, and as it appears to me that further confirmation of them would be highly useful, I have obtained permission of Mr. Wilson to mention a remarkable case of this kind, which occurred to his notice. — A gentleman fell down suddenly, and remained for some time in that lethargic state which is usual in apoplectic cases; but afterwards gradually recovered his faculties both of mind and body, and continued to exercise them



them very perfectly for two years, when a second attack of the same kind took place, and destroyed him. Upon opening the head, the cause of his death became evident; for a large quantity of blood was found in the ventricles, and at the basis of the cranium. But what seemed particularly worthy of attention, was a cavity in the right hemisphere of the brain, extending from the front to the back part of the cerebrum, being more than four inches in length, and more than an inch in breadth, Within this cavity were contained flakes of coagulated lymph, and a bloody-coloured fluid, which Mr. Wilson, whose abilities and accuracy of observation entitle his opinion to the fullest credit, was convinced were the remains of the blood extravasated at the first attack.

I also examined the brain of a gentleman, with whom, for the last five years of his life, I was intimately acquainted. When I first knew him, he was slowly recovering from a severe fit of apoplexy, which had paralysed the left side of his body. Though he could not raise his left arm to his head, nor move his left thigh and leg with freedom,

dom, yet he walked about moderately well, and could work in his garden. Every winter he was subject to fits of the gout, and every summer to such a plethoric and inflammatory state of the vessels of the head as to threaten another apoplexy. He was once immediately and most completely relieved from very distressing feelings from the latter cause, by the abstraction of ten ounces of blood from the temporal artery. The last fit of apoplexy, which I have mentioned, was the third, with which he had been afflicted. The first affected his speech, the second his right arm, and the third produced the effects which I have related. His bodily and mental powers remained however very vigorous, even during the five last years of his life. On dissection three apoplectic cells were found. One was situated superficially in the left lobe of the cerebellum, one in the left hemisphere of the cerebrum, and one, which had probably been the cause of the last and greatest degree of paralysis, in the middle of the right hemisphere of the brain. Nothing but the membranes, which immediately invest the brain, covered the effused substance, which  
had



had become of a gelatinous nature. I do not exaggerate, when I say, that this cavity was large enough to have held six ounces of blood.

Though a slight degree of pressure does not immediately affect the functions of the brain, yet it may act in another way;—it may excite inflammation of that organ, as it does of other parts of the body. Its power in this respect, however, will probably lessen by the part becoming accustomed to it; and the cases on record, where fractures with depression have done well, as well as those of recovery from apoplexy, are proofs, that the cause which in the first instance was injurious by its pressure, may continue to exist without inconvenience. Such cases ought surely to deter surgeons from elevating the bone in every instance of slight depression, since, by the operation, they must inflict a further injury upon their patients, the consequence of which it is impossible to estimate.—From all, therefore, that I have learned from books, as well as from the observations I have made in practice, and from reasoning upon the  
c 3 subject,

subject, I am disposed to join in opinion with those surgeons, who are against trephining in slight depressions of the skull, or small extravasations on the dura mater. In the latter, it is probable the compressing cause will soon be removed by absorption; and in the former, according to the observations of Mr. Hill \* and Mr. Latta †, the bone will regain its natural level if the subject be young. In adults, however, and especially in persons of advanced life, this circumstance cannot be expected; so that in them the accommodation of the parts to each other, necessary for preventing future mischief, must be effected by a corresponding alteration in the form of the brain.

A circumstance, however, frequently occurs, that may render the surgeon doubtful as to what course he ought to pursue; this happens when, at the same time that the skull is slightly depressed, the patient labours under the effects of concussion. The circumstances, which generally serve to distinguish

\* Cases in Surgery, p. 113.

† Pract. Syst. of Surgery, vol. ii. p. 172.



those two injuries, will be noticed hereafter. At present it is only necessary to observe, that, as the effects of the latter gradually abate, a little delay will enable the surgeon to decide upon the nature of the mischief, and take his measures accordingly. Where the patient retains his faculties, nothing farther is necessary than a continuance of the antiphlogistic plan; and should any inflammation afterwards take place, the same means, employed in a degree proportioned to the urgency of the symptoms, will in most instances be successful without elevating the bone. This happened in four of the six foregoing cases, which are related without any view to this particular point.—But if, from a peculiar disposition of the brain to be affected by pressure, the torpor of that organ should continue; or if, after inflammation of the brain has taken place, the pressure should then appear to be particularly injurious, the elevation of the bone ought not, I think, to be deferred. And from some of the cases related by Mr. O'Halloran, in the fourth volume of the Transactions of the Royal Irish Academy, it appears that this operation, if

not too long delayed, will give effectual relief under such circumstances.

The older surgeons certainly trephined unnecessarily, in consequence of their belief, that the brain was an organ of so delicate a structure, that the least degree of pressure would be highly injurious; whilst others, from having witnessed the frequent ill success attending the operation, and from having observed that many patients had recovered unexpectedly when it was omitted, seem inclined, too generally, to reprobate the practice. Under these circumstances, it appeared proper, by the recital of instances to shew, what kind of cases would probably do well without having recourse to it. With this view I have laid before the public the preceding cases; and I wish, in conclusion, to offer in this edition, a few additional Remarks on the circumstances which would influence my conduct with regard to the immediate performance, postponement, or omission of the operation.

The preceding cases shew, that in general there is no necessity for trephining in such fractures of the skull as occurred in them.

It



It may further be stated as an argument against the hasty performance of this operation, that it is likely to aggravate the inflammation of the brain, which in the majority of cases comes on in consequence of the injury.

If it can be shewn, that injury done to the scalp and bone, where there is no fracture or concussion may sometimes be productive of inflammation of the brain, it would then follow, that the injury inflicted on these parts in the operation of trephining would probably aggravate the inflammatory symptoms, which are to be expected to succeed to all violent blows on the head. To shew that disorder of the brain is likely to take place from its sympathy with the parts which contain that organ, I relate the following cases.

#### CASE VIII.

A coachman standing on a small ladder to clean the top of a carriage, slipped and fell, with his head against the window, which was drawn up at the time. The window being thus broken, the sharp edge of the  
glass

glass divided and turned down the scalp to a considerable extent from off the parietal and frontal bones. In this state he came to my house, with the arteries bleeding profusely. I tied two of them, replaced the scalp, and sent him to the hospital: the next day he did not appear much indisposed; but after another day or two had elapsed, he suffered much from inflammation of the scalp, part of which was even in a sloughy state. The patient had, at the same time, violent fever, and great disorder of his stomach and bowels. Small doses of calomel and gentle aperients were given for the latter affections; and he also took saline, and other febrifuge medicines. After about a week had elapsed, the scalp assumed a much better appearance, the inflammation having subsided, and the sloughs being detached. Nevertheless, his febrile state became aggravated, and a kind of delirium and symptoms indicating inflammation of the brain, came on, which venæsection did not subdue. The patient died, and his head being examined, it was found, that the brain and its membranes had undergone considerable inflammation, which, from



the degree of effusion between the tunica arachnoidea and dura mater, and between it and the pia mater, appeared to have lasted for a considerable time.

#### CASE IX.

A man had the scalp bruised and torn down from off the frontal bone by the wheel of a cart. He was not stunned at all by the accident. The bruised scalp mortified and the bone was left bare. He remained in the hospital waiting for exfoliation, and as he had no illness, but little attention was paid to him. After about two months, however, he became weak, and ultimately delirious, and died; on examination an abscess containing about one ounce and a half of pus was found in the front lobe of the cerebrum, beneath the dead bone, and full half an inch from the surface.

If then irritation and inflammation of the scalp and bone may sometimes produce similar affections of the brain and its membranes, this very circumstance affords an argument for performing the operation in a  
certain

certain description of cases, in which, indeed, its necessity may not be immediately apparent. I allude to those cases in which, though the bone be but slightly depressed, and may not occasion decisive symptoms of pressure, yet it may be broken into many pieces, and the scalp be so bruised, or otherwise injured, as not to be likely to unite by adhesion. Inflammation and suppuration must now ensue in the scalp, and some of the pieces of the bone will probably perish, and must be detached by tedious processes, which may induce disease in the subjacent membranes of the brain, as well as in that portion of the organ which they invest. I have therefore deemed it necessary to trephine in some cases of this description; and I think it will be useful to relate briefly one case of this kind. It will also serve as a contrast to that which immediately succeeds to it.

#### CASE X.

A drunken woman was knocked down on Blackfriars Bridge, by a blow with a cane, which had a round leaden head, about an inch in diameter. A circular piece of bone was  
beaten



beaten in to the depth of a quarter of an inch, and starred or broken into many fragments. By dividing the scalp, I had the power of reflecting a portion of the integuments, so that I could trephine the bone, and remove the shattered and depressed pieces. I also took out a clot of coagulated blood as large as a walnut. The wound was closed by sticking plaster, a compress laid over the part, and bound on by sticking-plaster. The patient was largely bled, and a dose of purgative medicine was given.

It was difficult to determine whether the sleepy and stupid state of the patient was chiefly the effect of the injury or inebriety. She complained loudly during the operation. The next day, when the students of the hospital wished to examine whether the dressings were displaced or not, she refused to permit them; but on my entering the ward, she said, aye, now he is come, you may examine if you please. I need only add further, that a treatment calculated to prevent and controll inflammation was strictly persevered in, and that the patient shortly became perfectly well.

CASE

## CASE XI.

June 3, 1802. A coachman, twenty-three years of age, was thrown from his box. The middle of the anterior edge of the right parietal bone was fractured, and a piece about the size of a sixpence was slightly depressed. He soon recovered from the stunning occasioned by the fall, and did not come to the hospital till the succeeding day. As he was perfectly well, he was but slightly bled, and no bad consequences of this injury appeared for two months. At this time he came again to the hospital, complaining of spasms in his left arm. The wound, which was not yet healed being examined, the depressed bone was found to be loose, and was removed, which alleviated the spasms. Soon afterwards a portion of the external table of the skull also came away. In the middle of September his health seemed much deranged, and he continued to get weaker till the middle of October. The dura mater had gradually become protuberant, and covered with a fungus; it at last gave way, and coagulated blood was discharged, mixed with detached pieces



pieces of the substance of the brain. The left arm had now lost its sensation, though the patient could feebly direct its motions. On the 17th of October the patient became very ill, and much bloody serum was discharged from the wound. He was delirious during the night, but on the next day understood all questions proposed to him; blood and brain were discharged through the wound. On the evening of the 19th he died. There was found a vacancy in the membranes of the brain, opposite to the deficiency in the bone, through which the effused blood and injured brain had been discharged. In other respects these membranes were perfectly found. The whole right hemisphere of the brain seemed to be reduced into a pulpy and fetid mass, composed of a mixture of blood and brain; except that the cortical substance, to the depth of about half an inch, remained found. This large cavity communicated with the left ventricle under the fornix.

It may be further stated as an argument against the immediate performance of the operation

operation of trephining, in cases where its necessity is dubious, that it deprives the brain and its membranes of that natural support which they receive from the bone. Under these circumstances, when inflammation comes on, the volume of the parts contained in the cranium, will be so considerably augmented by the præternatural distention of their vessels, and subsequent effusion of fluids, as to be protruded up into one aperture. The dura mater is likely to give way, and the pia mater becoming exposed, will be more subject to inflammation. It now sustains the pressure which was formerly supported by the dura mater, and in its turn ulcerates, and the brain will protrude and produce fungous excrescences. These circumstances are more particularly likely to happen in children; in them, indeed, the dura mater is so firmly connected with the bone, that it is rarely separated by accidental violence, and it is even difficult to tear off the bone, when it has been perforated by the trephine. The argument against immediately trephining the cranium, unless urged to it by great necessity, applies, therefore, more strongly to  
to

to cases of children than to similar accidents occurring in adults. These remarks shew the necessity for the most copious evacuations after the operation of the trephine, in order to prevent as much as possible the augmentation of the bulk of the contents of the cranium by subsequent inflammation and effusion, and which is productive of the prejudicial effects above stated.

With a view to obviate these, the plan of treatment instituted by Mr. Mynors of Birmingham, highly deserves imitation. Having, by a simple division of the scalp, gained room for the application of the trephine, and removal of the depressed bone, he closed the wound attentively, and the scalp united by adhesion to the dura mater on which it lay. A gentle pressure, such as would give to the membranes of the brain that support which they were wont to receive from the bone, seems also likely to be useful.

There are, doubtless, some depressions of the skull that it would be absurd not to elevate by an immediate operation, for in



them the pressure on the brain would of itself be productive of fatal consequences. The arguments which I have stated against the immediate performance of the operation, apply therefore, in my opinion, only to dubious cases, to those in which, perchance, upon the subsidence of the inflammatory symptoms, the pressure may be found not to be so great, but that it may be borne without detriment, though there is a risque that it may be detrimental.

Under these circumstances, by postponing the operation, we avoid the aggravation of the inflammatory symptoms which immediately succeed to the injury, and those consequences which arise from leaving an aperture in the cranium into which the contained parts are likely to be protruded. I say, by postponing the operation, because, if upon the subsidence of the inflammatory symptoms, the pressure by itself is found to produce prejudicial effects, we are still at liberty to perform it, nor is it likely to be attended with that violent inflammation which arises from the injury and operation conjointly.

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There must be dubious cases, for a degree of pressure which might be borne in one person without inconvenience, may, in another, occasion a torpid state of the brain, or other symptoms requiring its removal. Mr. O'Halloran's cases appear, therefore, to me very valuable, because they shew that the operation of trephining will succeed under these circumstances; and, I know, that it has been twice performed of late in London with perfect relief of those symptoms for which it was required, and without being followed by any inflammation which was not readily controlled.

## SECTION II.

*Injuries of the Head attended with Extravasation of Blood upon the Dura Mater.*

In the three following cases the skull was broken, and depressed at the part which covers the middle artery of the dura mater, by which means that vessel was lacerated. The attention of surgeons has not been sufficiently directed to this event, although it is of the utmost importance; for the life of the patient might often be saved, if the nature of the accident were known, and the bone speedily perforated. — These cases likewise display, in a very striking manner, some of the effects caused by great pressure on the brain.

## CASE XII.

A man was knocked down by the iron hooks of a crane, which fell upon his head from a considerable height. He was stunned at first, but soon recovered his powers of mind and body so far as to walk home, undress himself, and go to bed. A surgeon  
was



was sent for, who, on his arrival, found the man senseless, and in a deeply apoplectic state. The patient was immediately brought to St. Bartholomew's Hospital, when the functions of life seemed nearly suspended, as he was almost without sensation, his breathing being slow, irregular, and stertorous, with an unequal, intermitting pulse, and cold extremities. — The scalp covering the right parietal bone was wounded; and on dividing it more extensively, a fracture with depression was discovered, running obliquely across the anterior and inferior angle of the parietal bone, over the temporal bone, and extending to the basis of the cranium, before the mastoid process. Several perforations with the trephine were made along the course of the fracture, and the depressed portion taken away. A surprising quantity of coagulated blood was found upon the dura mater; the coagulum being not less than an inch and half in thickness, and six or seven inches in circumference. On the removal of this coagulum, the brain, which had been indented by its pressure, remained in the same state as before, nor did it ever regain its ori-

ginal level; so that the patient experienced but little benefit from the operation, and he died about twelve hours after receiving the blow.

The dura mater, in this case, was not torn through in any part; so that the blood could not have come from any vessel within that membrane. The source of such a profuse hæmorrhage, however, could not be doubtful, when it was known that the fracture crossed, and had probably wounded, the principal artery of the dura mater; yet that vessel did not bleed after it was exposed.

#### CASE XIII.

A boy, about fourteen years of age, fell from a scaffold near two stories high, and pitched on his head. When brought from Islington to the hospital, he appeared to be almost in a dying state. The anterior inferior angle of the parietal, and part of the frontal bones, were found depressed. A piece of the cranium being taken out with the trephine, I discovered beneath it a large quantity of coagulated blood; I therefore made the next perfora-

perforation nearer to the trunk of the principal artery of the dura mater, from which I concluded that this hæmorrhage had taken place. Having gently removed some of the coagulum, and introduced my finger into the aperture which had been made, I passed it as far as the second joint, before I could touch the dura mater. Fluid arterial blood now gushed out in such quantities as to keep the bone covered on which I was next to trephine. I ran no risk, however, in performing the operation; for the dura mater was depressed so much that it could not be injured. But to guard against even the possibility of such an accident, I introduced my finger between the dura mater and skull, and then perforated the bone with the trephine. Having thus removed a third piece, which was directly over the principal artery, I took out about four ounces of coagulated blood; upon which the dura mater quickly rose to its original level, and the hæmorrhage from the wounded artery ceased. I now entirely removed the depressed portion of bone, and thus uncovered all the dura mater which had been detached; so that I could distinctly feel



its connection with the cranium all round. This satisfied me that no more extravasated blood was left behind.— The lad, who at the beginning lay quite insensible, with a feeble, intermitting pulse, and laborious interrupted respiration, became restless, and expressed sensations of pain towards the latter part of the operation. Being now asked, how he found himself? he replied, very well; Whether his head ached? he answered, no; If he was sure that he felt no pain? he said he was sure, and wished we would leave him alone.— I now took twelve ounces of blood from his arm, and he was put to bed, where he passed the night quietly. The next morning his bowels were completely emptied by a purge; and saline medicines, with antimony, were given, so as to keep the skin in a gentle state of perspiration. During the day he was sleepy, and lay quiet; answered questions very rationally, and complained of pain and giddiness in his head.— The third day he was disturbed, and less rational. Eight ounces of blood were taken from him, and a blister was applied to his neck. These means relieved him greatly, and he became quite  
tranquil

tranquil and collected. — On the sixth day, symptoms of irritation again took place, and were again relieved by similar treatment. The dura mater had granulated, and the whole wound looked healthy. Every thing went on remarkably well until the fifteenth day, when the patient was seized with rigor and pain in his head, and the healthy aspect of the wound was also changed. The following day, there was perceived, in the middle of the exposed dura mater, an aperture through which a protrusion of the brain arose, covered by the pia mater, which retained its natural appearance. In less than twenty-four hours this tumor increased to the size of an orange; its surface was dark-coloured, and irregular, and the pia mater no longer distinguishable. The following morning the boy died; and his friends had removed the body from the hospital before I knew of his decease.

I regretted very much that I could not examine the nature of this fungus or hernia cerebri, as it was a phænomenon which I had more than once contemplated with surprise,  
and

and the nature of which I was afterwards fortunately enabled to ascertain.

#### CASE XIV.

A man was knocked down in Smithfield by a brick-bat, thrown at him by some villians against whom he had appeared as evidence upon a trial. He was immediately brought to the hospital; but in a state of profound apoplexy. — The right side of the frontal bone, and the lower part of the parietal, were beaten in; the area of the depressed piece being two inches in diameter. After making three perforations in the circumference, I was enabled to remove the depressed portion. I then took out a large handful of coagulated blood, which lay upon the orbitary process of the frontal bone, and had so pressed back the anterior lobe of the brain, that I could, with my finger, touch the transverse spinous process of the sphenoid bone. The brain now rose slowly, in consequence, I suppose, of the blood gradually finding its way through the compressed vessels; and the man began to shew signs of returning sense. — He was bled, and his bowels were emptied by a purge.

The



The next day he was so far recovered as to give an imperfect account of the accident; but on the third day, he died convulsed.

On dissection, some blood was found between the dura and pia mater, and traces of inflammation appeared on the latter membrane.

Mr. Hill, of Dumfries, relates a case (the fifth), where the artery of the dura mater was ruptured without either fracture or depression of the skull; and when he trephined a second time, four days after the accident, he found so large a coagulum of blood lying upon that membrane, as to make him afraid of removing it all at once: but on taking out a few ounces of it, the patient, who had hitherto lain in a state of apoplexy, looked up, on being spoken to, like one awakened from sleep, — knew, and named every body, and raised the arm belonging to the opposite side, which had been paralytic from the time of the accident.

In Mr. Latta's Surgery also, a similar case (as shewn on dissection) is related, in which  
an

an uncommon slowness of the pulse, and coma without stertor, were the symptoms produced.

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These cases shew that a fracture of the skull is not likely to be followed by an equal degree of extravasation in every part, as the vessels connecting the dura mater to the cranium are, in most parts of that membrane, of a small size. If these are accidentally ruptured, a slight hæmorrhage ensues, which soon stops, and only a thin stratum of coagulated blood is found when the bone is removed. But if the fracture happens in the track of the principal artery of the dura mater; if the trunk, or even a considerable branch of that vessel be torn, the hæmorrhage will be profuse, and the operation of the trephine become immediately necessary to preserve the life of the patient. In the three cases that I have related, the operation was done very shortly after the accident: in the first case, the brain was so compressed that it did not regain its level; in the third, it rose slowly

as the blood found its way through the vessels ; and in the second, it rose quickly, and the functions of the brain were as quickly restored. It can scarcely be doubted, then, that if the operation had been performed in these cases as soon as it became necessary, when, perhaps, only one instead of many ounces of blood were poured forth from the torn vessel, the lives of the patients might have been preserved.

It is of great importance to distinguish accurately the nature of such cases ; and the distinction is not difficult when there is an interval of sense between the blow and the stupor occasioned by the effused blood. In the first related case, for instance, the nature of the accident was made sufficiently evident by this circumstance. But though we are assured that the patient labours under the effects of compression, we cannot, in many instances, know the situation of the compressing cause. In other cases, again, where there is no interval of sense after the accident, we are at a loss to determine whether the senseless state be the effect of compression or  
of



of concussion. Every surgeon must acknowledge that it would be a very desirable thing to ascertain when blood is effused between the dura mater and the skull; for if the extravasation has happened in the more interior parts, a surgical operation is not likely to afford relief\*. Now, if the extravasation which compresses the brain, be situated immediately beneath the bone, I think there are signs by which it will be disclosed; and as sufficient notice has not been taken of these, I wish particularly to call the attention of surgeons to them.

\* In those cases, which I have seen, where blood was extravasated between the dura and pia mater, and a division of the former membrane was made for its discharge, in some instances the serous part of it only could be evacuated; for the coagulum was spread over the hemisphere of the brain, and had descended as low as possible towards its inferior part; in others, though a portion of the effused blood was discharged in a fluid or grumous state, a considerable quantity which was coagulated remained behind, so that very little relief was obtained by the operation. It seems then, that extravasation between the dura mater and the cranium is almost the only case which admits of being remedied by the use of the trephine.

I have

I have already said, that, unless one of the large arteries of the dura mater be wounded, the quantity of blood poured out will probably be inconsiderable; and the slight compression of the brain which this occasions, may not be attended with any peculiar symptoms; or perhaps it may occasion some stupor, or excite an irritation disposing the subjacent parts to become inflamed: but both these effects will gradually abate, nor will any inflammation ensue, if proper means are taken to prevent it. It is indeed highly probable, that, in many cases which have done well without an operation, such an extravasation has existed. But if there be so much blood on the dura mater as materially to derange the functions of the brain, the bone, to a certain extent, will no longer receive blood from within; and by the operation performed for its exposure, the pericranium must have been separated from its outside. I believe that a bone so circumstanced will not be found to bleed; and I am, at least, certain, it cannot, with the same freedom and celerity as it does when the dura mater remains connected with it internally. I  
need

need hardly say, that, in the cases which I have related, there was not the least hæmorrhage. But it is right to mention, that I have also twice been able, by attending to the want of hæmorrhage from the outside of the cranium, to ascertain the extent to which the dura mater was detached within; and very frequently, when symptoms appeared to demand a perforation of the skull, I have seen it contra-indicated by the hæmorrhage from the bone, and, as the event has proved, rightly.

When the bone has remained long bare, the case may become perplexing. I once scraped a portion of the cranium which had been some time denuded, and found that it bled in such a manner, as, in my opinion, sufficiently to point out the adhesion of the dura mater, and of course the inutility of employing the trephine\*.

\* In aged persons, and in those in whom the circulation has been rendered languid by the accident, the mode of distinction which I have pointed out, may indeed be less conclusive.

Where



Where the extravasation on the dura mater is but small, it will probably not require any operation. A slight hæmorrhage from the bone, which may happen from the anastomosing of the vessels within its substance, will not, in this case, lead to any injurious error. But from what I have observed, I am inclined to believe, that even a small effusion of blood will diminish the hæmorrhage from the superincumbent bone.

Mr. Pott had an idea, that the bone would perish when the dura mater was detached for a considerable space from its inside; and some cases which he has related, seem to favour this opinion : but many other cases to be met with in authors, and many which have occurred to my observation, prove that the opinion was not well founded. Indeed we cannot suppose that the bone would perish from this cause; for it still receives blood, not only from the anastomosing of vessels within its substance, but also from the pericranium externally; and the success which has of late attended the operations for aneurism in the lower limbs, shews that parts of great bulk

and vascularity will continue to live when their usual supply of blood is very much diminished. If, however, the dura mater should be detached for a considerable extent from the inside of the skull, at the same time that the pericranium should also be stripped from its outside, I am inclined to believe that a portion of the bone would, in that case, die and exfoliate.

## SECTION III.

*Cases of Fungus, or Hernia Cerebri.*

## CASE XV.

A MAN, about forty years of age, was knocked down, and had a considerable part of the parietal bone, near the coronal suture, depressed, by a stone falling on his head from a high building. A portion of bone was taken out, and the depressed piece elevated. The patient, after this, seemed to obtain great relief from the stupor under which he had till then laboured. But the next day, he became very restless and delirious, and frequently endeavoured to get out of bed. Evacuations were prescribed, and a blister applied to his head, by which means the symptoms were lessened, but did not entirely go off; they continued near six days, only varying somewhat in degree. His strength was now very much reduced; and though he became more tranquil, he was still delirious, and a coma supervened, which



increased daily. — On the tenth day, upon uncovering the wound in order to dress it, a hernia cerebri appeared, rising through an ulcerated opening in the dura mater. The tumour at this time was not larger than a pigeon's egg; the pia mater, stretched over its surface, was inflamed; and a turbid serum oozed at its side from beneath the dura mater. On the following day, the tumour had acquired the size of a hen's egg, was still smooth on its surface, and apparently ready to burst. On the day after, before the time of dressing, the man died. — Upon examining the tumour now, it was found larger than before, and of a dark colour, with an irregular granulated surface; which appearance seemed owing to coagulated blood which adhered to its surface, as the part had bled so much, that one half the cap which the man had worn, was rendered quite stiff by it. In raising the top of the skull to inspect the contained parts, the tumour was in some degree torn from its basis. The pia mater was in general much inflamed, and, as well as the dura mater, was deficient at the place where the tumour protruded. A part of this tumour  
being

being cut off where it was lacerated, appeared to consist of coagulated blood of a fibrous texture. The brain was now taken out, and the tumour carefully examined, when it was found to be of the same nature throughout, and to have originated within the substance of the brain, about an inch below the surface; but I could not discover the open vessel from which the hæmorrhage had proceeded.

The appearances, on dissection, clearly explained the cause of the symptoms which had taken place, and rendered it evident, that the disease under which this man had chiefly laboured, was inflammation of the pia mater. The nature of the tumour, also, was not less satisfactorily pointed out. It was plain, that, in consequence of the brain being injured to some depth beneath the surface, disease of the vessels, and consequent effusion of blood, had ensued; that the effusion was for a time restrained by the superincumbent brain and its membranes; but these gradually yielded to the expansive force exerted from within, and at last giving way altogether, the fluid blood oozed out and

congealed upon the surface of the tumour. It appears very probable, that the disease frequently described by the term *hernia cerebri*, consists, as in this instance, of a tumour formed by coagulated blood ; for an organized fungus could hardly be produced in so short a time as that in which these tumours are usually formed.

#### CASE XVI.

A carpenter, while at work in a newly-built house, was crushed by a part of the wall falling in upon him. His abdomen was bruised, his clavicle broken, and his head wounded. Beneath the wounded scalp, the right parietal bone was found fractured and depressed. He was slightly comatose for many hours after being brought to the hospital, yet answered rationally to those questions that were put to him. As the coma, however, remained, and his pulse did not beat with the freedom that is usual, the surgeon under whose care he was admitted, thought it right to trephine him. Accordingly, one perforation being made, the depressed bone was elevated. No blood was found  
upon



upon the dura mater, nor did any thing indicate the propriety of using the trephine a second time. The patient was largely bled; and saline medicines, with antimony and opium, were given. As he complained much of pain in his belly, fomentations were applied to this part, and clysters administered occasionally. He was again bled on the second and fourth days after the operation. At the end of a week the antimony was omitted, on account of his weakness; and he seemed to get rather better, until December 7, twelve days after the accident, when a hernia cerebri appeared, rising through an aperture in the dura mater, opposite to the perforation in the skull. It increased rapidly in size, and exhibited the same appearance described in the foregoing case. — Two days after this, the patient died.

On examining the head, the dura mater was found every where adherent to the skull; but on its inner layer there was a secretion of pus. The hernia cerebri, which had pushed up through an ulcerated opening in the dura mater, was of a fibrous texture, and evidently

formed of congealed blood deposited in the medullary part of the cerebrum; the containing cavity being about an inch diameter, and its parietes appearing to be the substance of the brain condensed by pressure. I was equally unsuccessful here in my search after the vessel, whence the blood had issued. The ventricles of the brain were full of a ferous fluid mixed with blood, and a large abscess was also found in the spleen. — In this case, the mental faculties were not deranged as in the former. Both the symptoms and dissection shew the disease to have consisted in the effects of concussion, with inflammation of the dura mater, and subsequent effusion into the ventricles of the brain.

The opinion I had formed respecting the nature of *hernia cerebri* was now confirmed; and I think it received additional illustration from the following case, although the disease was in a different part of the body. — A patient in the hospital had a disease in the head of the tibia, from whence there arose an unhealthy fungus, which Mr. Blicke removed; and afterwards, the bone was kept bare

bare by caustic applications, in hopes that a separation of the diseased parts would take place. The patient, however, became feverish, and his health was much impaired. On the cessation of the fever, there suddenly arose, within the wound, a fungus-like substance, about the size of a large apple, which seemed to sprout from the bone; it was of a livid colour, and its surface appeared as if covered with floughs. I took off the tumour, which was nothing but coagulated blood, with the knife; and some blood oozed from its basis, but the hæmorrhage was stopped by the application of lint. In a few hours, however, a similar fungus-like tumour arose. As both the size and situation of the open vessel were unknown, and as the patient could neither support the loss of much blood, nor the irritation which an extensive wound, made in search of the artery, together with that arising from the diseased bone, would infallibly produce, it was judged best to remove the limb. This was accordingly done; and upon injecting water into the popliteal artery, it was found to be a branch of that vessel which had given way.



It seems that Paré, and the surgeons who lived about his time, often mistook the tumours that arose out of the cranium, for aneurisms, on account of their pulsatory motion. M. Louis, in the *Mem. de l'Acad. de Chirurgie*, tom. V. has well distinguished the nature and treatment of those proceeding from diseases of the dura mater or bone. There may, perhaps, be tumours of various kinds arising from the pia mater and brain; but if there are such, I believe they have not been discriminated; and the accounts given of many of them by authors, are similar to those just recited. They have generally been treated of under the name of fungus or hernia cerebri; and if the effused blood of which they consist, ever acquired vascularity, they might then deserve that title: but none of those that I have just noticed were of an organized structure. — Their formation seems to proceed from an injury done to a part of the brain by concussion or contusion, which has terminated in a diseased state of the vessels, similar to what occurs in apoplexy. The morbid state increasing, one or more vessels give way, and an effusion of blood into the

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substance

substance of the brain ensues, which, if the skull were entire, would probably occasion apoplexy, but, where there is a deficiency of bone that allows it to expand, presses the surface of the brain and its meninges through the vacant space. The dura mater soon ulcerates, and the tumour pushing through the openings, now increases with a rapidity proportioned to that with which the hæmorrhage takes place within. At last, the pia mater, and the stratum of the brain which cover the effused blood, are so extended as to give way, and the blood oozes out and coagulates. — Thus, the quick growth, and all the other phænomena observable in these tumours, are satisfactorily accounted for.

The plan of treatment to be adopted with tumours of the kind which I have described, is next to be considered; but as I have had no opportunities of acquiring knowledge as to the treatment of these diseases, since I became acquainted with the nature of them, I can only offer a few general remarks on this subject.

Where

Where no bad symptoms precede the appearance of the tumour, or where they go entirely away upon its being freed from the confinement of the dura mater, it may, perhaps, be most prudent not to interfere in the treatment of the complaint: for probably the hæmorrhage will cease, and the coagulum will drop off in pieces \*, or gradually waste away, and be no more renewed †. All that appears necessary, then under such circumstances, is to cover the tumour and fore with some mild dressing, carefully avoiding all pressure, which both reason and experience shew is likely to be attended with bad consequences. Should the bulk of the tumour, however, become inconvenient, or render pressure from the dressings unavoidable, the practice which present experience has shewn

\* See a case in the *Edinburgh Medical Commentaries*, vol. i. p. 98, where the tumour continued to increase for fourteen days, and had acquired the size of a goose's egg, when it dropped off in pretty large pieces. A similar case is related in the *Medical Museum*, vol. iv. p. 463.

† Fabricius Hildanus relates a case in his *Fifteenth Observation*, where the tumour arising from the brain became, in 24 hours, as large as a hen's egg, and afterwards gradually disappeared,

to



to be most successful, consists in occasionally paring off the tumour with a knife. In this manner Mr. Hill treated several cases with success.

But if the tumour continues to increase, and if the patient suffers a train of bad symptoms, apparently arising from irritation and pressure made on the brain, some further attempt to relieve him seems to be required. Under these circumstances, we have reason to suspect that the coagulum, from want of room to protrude, is enlarged internally; or that by plugging up the orifice in the bone, it prevents the escape of some fluid collected within the cranium\*. The obvious mode  
of

\* Mr. Hill, in relating a case of this kind, says, that he “was obliged to shave away the tumour, and push a lancet into its root as often as the stupor and other symptoms shewed that matter was lodged there, by which the patient was uniformly relieved, and afterwards recovered.” — (See his Cases in Surgery, p. 91-2.) But very different was the event in two similar cases (one is recorded by Scultetus, in his *Armamentarium Chirurgicum*, Obs. XIX.; the other in the *Lond. Med. Journal*, vol. x. p. 277.), in which repeated attempts were made to prevent  
the

of relief here appears to be, to enlarge the opening in the bone in proportion to the extent and increase of the tumour. Many surgeons have objected to the removal of much of the cranium, lest protusions of this kind should ensue; but it is evident that these tumours arise from an injury and consequent disease of a part of the brain, the event of which must be more fatal if the bone were entire. A large removal of bone was formerly a frequent event; but a protrusion of this kind very seldom took place.

But although, by thus allowing a free escape to the effused blood, we may prevent the injurious effects of its pressure on the brain, yet the degree of hæmorrhage may endanger the life of the patient.

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the growth of the tumour by compression: one patient died at the end of a month; the other not until nearly six months after the accident. In the brain of each there was found, upon dissection, a large cavity, which had been formed by the accumulation of a fluid that could not escape, on account of the aperture in the bone being closed by the tumour.

The

The quantity of blood effused will depend on the magnitude of the vessels, or on their disposition to bleed. As the disease is generally situated not far beneath the surface of the brain, there is less risk of its proceeding from the former cause. If it arises from the latter, it is very likely that the distention caused by the confinement of the effused blood would irritate the vessels, and keep up their disposition to hæmorrhage; therefore the treatment already recommended is likely to diminish it. But should the quantity of the hæmorrhage seem to threaten the life of the patient, I should think it most proper to take away the coagulum, and to expose the cavity in the brain, in order to learn whether suffering some sudden loss of blood to take place, together with the exposure of the bleeding vessels, might not produce a beneficial change, and a cessation of the hæmorrhage. I am induced to propose this mode of conduct, from reasoning founded on analogy; for in other parts of the body a hæmorrhage will sometimes continue, notwithstanding a considerable pressure made by a large quantity of coagulum, together with  
that



that which the resistance arising from the closure of the external opening, and that which is occasioned by the dressings, conjointly produce. Yet, upon exposing the bleeding surface, the hæmorrhage will cease, and never afterwards be renewed.

I am still further induced to propose this plan of treatment, because I do not perceive any other which carries with it a probability of success. The impropriety of attempting to restrain the hæmorrhage by pressure has been shewn; ligatures cannot be applied, and styptics are known, by experience, to be dangerous.

I shall extract one case from the first volume of the *Memoires de l'Academie de Chirurgie* \*, to shew that the removal of the coagulum is not likely to be attended with any alarming consequences. — A young man received a blow on the right parietal bone, which occasioned a fracture; some bone was

\* See the Memoire of Mr. Du Quesnay, 10th Observation.

removed, and a hernia cerebri was afterwards produced, which was repeatedly pared down with the knife. On the thirty-fifth day from the accident, the patient having intoxicated himself, while in this state, slipped his hand under the dressings, and laying hold of the protruding coagulum, tore it away with violence. The next day the surgeon found, that almost the whole of what he considered as corrupted brain, was removed, and a vacancy left, so deep, that he could see nearly to the corpus callosum. From this time forward the parts went on healing, until they got quite well; but the patient continued to labour under a paralysis of the left side, which had supervened the day after he received the blow.

It is obvious, from the nature of the substance of which the tumour is composed, that styptic remedies applied to its surface can have scarcely any effect in lessening its bulk, and none at all in putting a stop to its growth; and experience shews, that the more active of them are not only ineffectual, but highly dangerous. Hildanus, in his Fourteenth

Obs. relates the case of a man who died in consequence of an empiric having dressed a tumour of this kind with alum and calcined vitriol. And Mr. Hill tell us (p. 198), that, after shaving off the protruding part, he once sprinkled the basis with some blue vitriol, and another time with red precipitate; but found that "his patient had a very bad day after each of these;" no doubt, in consequence of their being dissolved by the discharge, and insinuating themselves between the tumour and the edges of the skull, so as to get into contact with the sensible parts within; for, that it was not owing to their effect upon the tumour, is evident from its indolence when he had removed it with the knife\*.

\* The foregoing cases explain a particular kind of protrusion, which seems to me to have been frequently described by authors, and of which they serve as specimens. Such occurrences cannot be observed without surprize; the suddenness of the protrusion scarcely admits the supposition of the protruded part being organized. It was never meant by the recital of these cases to deny, that the surface of the brain, when exposed and irritated would throw out a vascular fungus; it was only intended to describe a species of those appearances which had been  
denominated



## SECTION IV.

*Concussion of the Brain.*

As I am of opinion that the effects of concussion have not been justly described by authors, and as the symptoms related by them are not, according to my experience, those which usually occur, I have therefore selected two cases out of a great number that I have seen, in order to shew what have ap-

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denominated fungus or hernia cerebri. In all the cases of true fungus cerebri which I had seen when I first wrote the foregoing account, the fungus grew so slowly that it could not be mistaken or confounded with the appearances which took place in the cases I have cited. Since that period, I have seen cases in which the fungus grew much more rapidly, yet none in that degree which would make it liable to be confounded with the appearances described in the present section. The curative indications in the true fungus cerebri seem to be, to diminish those causes which occasion the brain to be thrust upwards against the bone, and to apply gentle pressure from without, so as to give that degree of support which the part ought naturally to receive from the dura mater and bone.

peared to me the common consequences of this injury; and I shall afterwards offer some remarks respecting the treatment of this affection.

#### CASE XVII.

Harriet Silverthorn, aged twenty-three years, slipped down stairs, and struck her occiput against some of the lower steps, by which the integuments were divided about half an inch in length, but the wound was not deep, nor were the surrounding parts much bruised. She was taken up senseless, was bled, and the next morning conveyed to St. Bartholomew's Hospital. When brought in, she was comatose; could not be made to answer any questions; yet she drew back her arm when pinched, and seemed very uneasy when the wounded parts were pressed upon. Her breathing was without stertor, but performed at some interval, as if she did not wish to inspire until obliged by necessity. The pulse, which was full and labouring, intermitted every fourth or fifth stroke.—Eight ounces of blood were immediately taken away, and an opening medicine given, which  
procured

procured three stools, after which she was ordered a mixture, containing aqua ammoniæ acetatæ, and antimonial wine. — The next day (*Friday*), she was rational, put out her tongue when desired, and said she had no pain in her head; her breathing was more regular, and her pulse free from intermission. (*Saturday*,) she was still more sensible, and gave some account of herself; complaining now of head-ach, and general uneasiness. The mixture was continued, the purging medicine given again, and a blister laid on between her shoulders. — (*Sunday*,) her pulse was harder; she was sensible, but restless; complained of pain in her forehead, sat up in bed, and wanted to go home. Six or eight ounces of blood were taken from her temples, and the mixture ordered to be continued as before. — (*Monday*,) she was much more composed; but as she had still some pain in her head, a blister was applied to it. — (*Tuesday*,) she had slept quietly during the night, answered rationally, but with quickness, and eagerly desired to go home. As the blisters appeared to have been serviceable, that on her neck was renewed. — (*Wednesday*,) she



was perfectly quiet, and in every respect better; nor had she, after this, any complaint worth mentioning.

#### CASE XVIII.

A Frenchman, twenty-seven years of age, who had been many years in England, and (as it afterwards appeared) spoke our language perfectly, had met with some accident (but in what manner, I know not), in consequence of which he was brought to the hospital. He was then very comatose, and expressed much uneasiness at being roused from that state; yet he put out his tongue when bid, but did not give a rational answer to questions put to him, and his replies were made in his native language. His pulse was regular, strong, and about 96 in a minute. Ten ounces of blood were taken from his arm; and after being purged, the common saline mixture, with antimonial powder, was ordered to be given. In the night he grew delirious, got out of bed, and tore the bandage from his arm; in consequence of which he lost a good deal of blood before it was perceived. This, however, seemed of use  
to

to him ; for he became more tranquil after it, and lay quietly dozing till morning. Next day, he was more rational, and complained of pain in his head. When I told him that if he kept quiet, he would soon be well, he said, he hoped so ; and appeared solicitous to know what should be done to him. His pulse was only 80, and not strong. A gentle laxative was given, and a blister applied to his head. — On the third day, he was much more sensible, spoke with clearness, and mentioned the pain being in the fore-part of his head ; yet, when I asked his age, he told me he was but sixteen years old. — *Tuesday* (fourth day), he appeared more excited and wild ; his tongue was dry, but his pulse only 75. Nine ounces of blood were taken from the temporal artery. — Fifth day, his pulse was only 70, and perfectly natural ; yet he had pulled off the dressing from his blisters, and seemed to be very irritable. — Sixth day, still pain in his forehead, pulse rather quicker, but tongue not furred. After this he gradually recovered, without any particular symptom occurring, and without any other medical treatment.

It is not likely that, in either of these cases, extravasation, at least to any considerable degree, had taken place within the head, since in neither of them was there stertor, dilatation of the pupils, or insensibility. They may, therefore, I think, be considered as exhibiting the symptoms which attend simple concussion. The foregoing cases were indeed instances of but slight concussion to what the brain sometimes suffers, and which proves fatal. To display the symptoms which occur in the worst cases, I relate the following instance.

#### CASE XIX.

W. Thomas, about thirty years of age, fell from the top of a brew-house, a height of at least 80 feet. His hand being stretched out, first sustained the shock, by which the carpal bones were separated, and driven upwards, some before, and others behind the ends of the radius and ulna, the articular surfaces and periosteum being at the same time forced off the latter bones. I mention these particulars to shew the great violence of the fall. The man's head afterwards struck the ground,

as



as appeared by a bruise on his face ; but the cranium was not injured. When brought to the hospital, he appeared almost deprived of life, his body being cold, and his pulse scarcely to be felt. The gentlemen then attending, put his feet into warm water, and gave him an opiate.

After this he gradually became warmer, and it was observed that there was not much dilatation of the pupils, and but little stertor in respiration. I saw the patient next morning, at which time his skin was very hot, and he perspired copiously. His breathing was repeated at regular intervals, but the expirations were made with unusual force. The pulse was extremely irregular, both in frequency and in strength ; generally about 140 in a minute. His pupils were moderately contracted, his eye-brows drawn into a frown as if he suffered pain. When I spoke to him softly, he did not answer. I pinched his hand slightly, but he did not move ; but when I repeated this a little harder, he drew it away with seeming vexation. He disliked that his eyes should be examined. When by

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speaking

speaking loud, I roused him, and inquired if his head ached, he answered, Yes. I got him to swallow some opening medicine, which emptied his bowels; and four leeches were applied to his temples; but they extracted very little blood, and I thought his pulse countermanded any further evacuations.

In the afternoon, he appeared better. His pulse was more regular, and his skin of a more natural temperature; his pupils, however, were more contracted, and his sensibility increased. I tried the effect of giving him forty drops of tinct. opii, thinking it might diminish sensibility, and keep him quiet for some time, during which the vascular system (which seemed to be particularly deranged) might perhaps regain its powers. The opiate increased his disposition to sleep, and he appeared to suffer less pain; but in the evening, his pulse was more feeble and frequent, and his skin hotter, and quite wet with perspiration. Wine was now given to him, but without any apparent benefit; the powers and actions of life gradually diminished, and before morning he died.

On

On dissection, there appeared every mark denoting violent inflammation of the brain and pia mater, of short duration. The minute arteries of the pia mater were turgid with blood; in many places there was the appearance called blood-shot, which was also to be seen in the lining of the ventricles. Dark-coloured, and in some places, bloody, coagulable lymph filled all the recesses between the tunica arachnoidea and pia mater. On dividing the substance of the brain, all its vessels appeared as if injected with blood.

I am inclined to believe that the medical treatment of this patient did him neither much good nor harm. The means employed seem to have acted on him as on a person in health. The opening medicine rendered him cooler, and quieted a little the disturbed actions of the system. The opiate made him more still, and disposed him to sleep.

I leave it to practitioners to consider, whether cordials would have been of any service in this case. Would they not rather, by stimulating the nervous system, have increased  
the



the disturbance of the sensorium, and, by exciting the heart and arteries, have tended to aggravate the inflammation of the brain.

I add another case, because it is remarkable for the violence of the subsequent inflammatory symptoms. The case was attended by Mr. Sheppard of Chew Magna, who was, at the time it happened, dressing pupil to Sir Charles Blicke at St. Bartholomew's hospital. To his judicious and unremitting attention I cannot but attribute in a great degree the ultimate welfare of the patient. The account which I have drawn up, is taken from Mr. Sheppard's notes.

#### CASE XX.

David Davis, a robust man, thirty-five years of age, was admitted into St. Bartholomew's hospital on the 21st of November 1799. He had fallen from a considerable height on his head, and had bruised and wounded the scalp, but without fracturing the bone. He was, when brought to the hospital, so far insensible, as not to be affected by slight impressions, and his extremities

mities were cold. His feet were put into hot water, and, after some time, he became warm and more sensible, and the pupils of his eyes contracted as in common. Twelve ounces of blood were taken from the temporal artery, and a purging medicine given. On the following day, the pulse being full and hard, sixteen ounces more of blood were taken away, and the purging medicine repeated, which procured several stools, and a blister was also applied to the nape of the neck. Notwithstanding these measures, however, he became delirious, and his skin felt hot, and he complained of pain in his head. Twelve ounces more of blood were therefore taken, and three grains of pulvis antimonialis given every fourth hour.

November 24. The delirium still continued, but the patient lay more quiet: his pulse was 120, and full, therefore twelve ounces of blood were taken, and as the delirium and strength of the pulse still continued, in the evening the bleeding was repeated to the extent of twelve ounces. His bowels were also emptied by magnesia vitriolata

olata and fenna. Afterwards he had thirty drops of Tinct. Opii given him at night. He slept some hours in the night, and next morning his pulse was less hard, and only 96 in a minute; his answers to questions were also much more rational, and delivered in a less loud and quick tone of voice than before. For during the greater part of the delirium he had been very unmanageable, rolling about in bed and endeavouring to get up, and speaking in a loud and fierce manner. Towards the evening the symptoms again increased; his pulse was 120, and harder and fuller than in the morning; his skin was hot, and he complained of thirst. He had taken purging medicine in the morning, which had operated. Three grains of antimonial powder were now given every fourth hour, and his feet put into warm water, in hopes of procuring perspiration: ten ounces of blood were taken from the temporal artery, and the opiate repeated at night.

25th. The patient had slept during great part of the night; his pulse 100; he complained of cold, though his skin was hot; and  
of



of great pain in his head. More stools were procured, and twelve ounces of blood were taken from the temporal artery. He now took six grains of pulv. ipecac. comp. every four hours.

26th. He had been delirious during the former part of the night, but had slept towards the morning; in other respects he was much as before. In the evening, as his pulse would bear it, twelve ounces of blood were again taken away.

27th. Pulse softer and frequent. He had three stools from medicine in the evening. The delirium seemed to have a little subsided, and he was much inclined to sleep, so that it was difficult to obtain an answer from him.

28th. A blister was applied to his head, and in the evening his pulse becoming full, ten ounces of blood were taken from him. Two grains of opium were given him at night.

29th. He had slept well but complained of his head, and of difficulty in swallowing,

and in the evening had hemiplegia of the right side of his body.

30th. He had slept but little, the bowels lax, the pulse small and frequent, the hemiplegia continues.

We had thus far been endeavouring, by the most powerful means, to subdue a violent inflammation of the brain, and could scarcely have be said to have accomplished our design, when a new affection called for attention. I think it can scarcely be doubted, that the hemiplegia was the effect of pressure made by an effusion of fluids, in consequence of inflammation, operating probably chiefly on the left hemisphere of the brain, so as to paralyze the opposite side of the body. Under this persuasion, and without expectation of success, I directed that two drachms, by measure, of strong mercurial ointment should be rubbed in on his arms and legs night and morning, and that five grains of the pil. hydrarg. with one grain of opium, should be given three times a day. These means were continued for three days without any striking

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ing amendment being perceived, but on the fourth (Dec. 4.) he stretched out his right arm when required, and he was able to swallow without difficulty. As he was getting better, the same plan was persevered in till the 9th, when the mercury had affected his mouth, and produced a diarrhœa. He now knew all those persons who attended him, and his state was surprisingly altered. During the inflammation of the brain he had been very unmanageable, and his replies and expressions were fierce and loud. Now he was extremely tractable, and wept whenever he was spoken to. His pulse was very feeble, and beat but 90 in a minute. It seems right to mention that a few days afterwards, when he was slowly recovering, one of the wounds of the temporal artery gave way, and he lost perhaps fourteen ounces of blood before it was perceived. This circumstance of course made him weaker, and increased the frequency of his pulse, but it did not much impede his recovery, which, though very slow, was very perfect. Extensive sloughing of the integuments of the nates had taken place, which it does not seem re-



quisite to mention, but inasmuch as it tends to shew the reduced state to which he had been brought. Indeed if this patient had not possessed a vigorous constitution, it seemed scarcely possible that he could have survived the debility which this disease and the treatment conjointly produced.

The extent of the evacuations, that surgeons are obliged to make in inflammations of vital organs, is such, as would deter the unexperienced from pursuing them, and must astonish those who have employed them with success, that they could be borne with so little apparent injury. It can only be accounted for by considering the disease as the stimulus which keeps up the actions of the constitution under such exhausting measures, as would occasion them to sink but for this excitement.

The opinions, that prevail amongst surgeons respecting the treatment of concussion, are very different. Many late writers advise stimulating cordials, such as wine, and volatile alkali, to be given; while others pursue a  
directly

directly opposite conduct. Nor do they agree in the account of the symptoms, which they consider as depending on this species of injury. Most writers represent the subject, as if the deranged state of the brain, which is the immediate consequence of the shock, continued to the termination of the patient's illness or of life; while, in the cases given by Mr. Pott, the symptoms appear to proceed more from the inflammation which ensues, than from the concussion.

The whole train of symptoms following a concussion of the brain, may, I think, be properly divided into three stages. The *first* is that state of insensibility and derangement of the bodily powers, which immediately succeed the accident. While it lasts, the patient scarcely feels any injury that may be inflicted on him. His breathing is difficult, but in general without stertor; his pulse intermitting, and his extremities cold. But such a state cannot last long; it goes off gradually, and is succeeded by another, which I consider as the *second* stage of concussion. In this, the pulse and respiration become better,

and though not regularly performed, are sufficient to maintain life, and to diffuse warmth over the extreme parts of the body. The feeling of the patient is now so far restored, that he is sensible if his skin be pinched; but he lies stupid, and inattentive to slight external impressions. As the effects of concussion diminish, he becomes capable of replying to questions put to him in a loud tone of voice, especially when they refer to his chief suffering at the time, as pain in the head, &c.; otherwise, he answers incoherently, and as if his attention could not be excited, or was occupied by something else; he is, in short, like a man in a heavy sleep. The concussion of the brain, lastly, produces a state of inflammation of the organ, and this constitutes the *third* stage, which is the most important of the series of effects proceeding from this cause.

These several stages vary considerably in their degree and duration; but more or less of each will be found to take place in every instance where the brain has been violently shaken. Whether they bear any certain proportion



portion to each other or not, I do not know. Indeed this will depend upon such a variety of circumstances in the constitution, the injury, and the after-treatment, that it must be difficult to determine.

With regard to the treatment of concussion, it would appear, that in the first stage very little can be done. From a loose, and, I think, a fallacious analogy between the insensibility in fainting, and that which occurs in concussion, the more powerful stimulants, such as wine, brandy, and volatile alkali, are commonly had recourse to, as soon as the patient can be made to swallow. The same reasoning which led to the employment of these remedies in the first stage, in order to recall sensibility, has given a kind of sanction to their repetition in the second, with a view to continue and increase it.

But here the practice becomes more evidently pernicious. The circumstance of the brain having so far recovered its powers, as to carry on the animal functions in a degree sufficient to maintain life, is

surely a strong argument that it will continue to do so, without the aid of such means; which tend to exhaust parts already weakened, by the violent action they induce.

It seems probable that these stimulating liquors will aggravate that inflammation which must ensue sooner or later. The access of it, in the cases which I have related, is sufficiently evident; and its cure is to be effected by the common methods. The great benefit of evacuations was, in those cases, very evident. Indeed, it appears to me, that there is no complaint which requires such means to be more rigorously prosecuted, than an inflammation of the brain or its membranes.

In addition to the reasoning which I have offered here, I would observe, that surgical books abound with cases in which suitable evacuations have been freely employed in concussion, with the best effects; while the advocates for a contrary practice have rested their arguments upon vague theory, and communicate no particulars of their success.

If the foregoing cases exhibit the genuine marks of concussion, the administration of cordial medicines, which has been so much recommended, appears to be very ill adapted to the relief of such an injury.

I have seen so many additional cases of concussion, so exactly corresponding to those formerly related, that I am more fully satisfied of the truth of the representation which has been given of them. I have in consequence been led more and more to wonder, that a contrary plan of treatment to that which has been so uniformly successful, could ever have been recommended, and to conjecture what cases could have occurred, in which such opposite practice must not have been strikingly prejudicial. Probably I may point out such cases; and as I do not find them described in books of surgery, because they have not been deemed sufficiently important, it may not be improper briefly to mention them.

A young lady was stooping in a closet, and rising up suddenly and forcibly she struck her  
G 4 head



head against a shelf. The blow occasioned extreme pain, but did not stun her. She went down stairs without mentioning the accident, and after sitting with her friends for a short time she fainted. As it was in the evening she went to bed, but could not sleep for pain in her head, and the next day her pulse was very languid, and her extremities cold; she complained of great pain when the scalp was slightly touched, and said there was a sensation as if cold water was dropping on it. She took some gentle opening medicine, which relieved these symptoms, but she could not sit up for many days, and it was a considerable time before she recovered from the languor, which the blow had occasioned: but neither fever, nor failure of sensation, or of intellect, took place in the slightest degree. I have seen many similar cases, and in one the patient said his sensations were such as would induce him to believe that his brain was loose, and moving on the inside of the skull. All these cases were relieved by slight evacuations, as gently opening medicines, leeches, or cupping, though I am inclined to believe that a contrary plan  
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of treatment, which has been recommended in concussion, might have been pursued without material detriment. Cases of this description are to be considered as arising from nervous symptoms, attendant upon slight injuries, rather than as effects of serious concussion. Mr. Pott, in speaking of concussion, says, that he never knew patients recover from the immediate consequences of it, without an imperfection in some sense, or part of the body, remaining. The result of my own experience has been very different; and yet I am ready to believe that such events may not unfrequently take place, as I know from examination, that the substance of the brain is sometimes lacerated and disorganized in violent concussions. I have, however, examined other cases of fatal concussions, without observing any such lesion of the substance of the brain.

It has hitherto been considered as a desirable object, to point out any marks by which we might distinguish between compression and concussion of the brain; but I believe

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no such criteria have yet been communicated to the public. If we judge of the symptoms of compression from what occurs in cases of apoplexy, or from cases like those which have been related of the rupture of the middle artery of the dura mater, (in one of which cases it was evident, that concussions had no share in producing the symptoms,) we must, I think, be of opinion, that pressure on the brain occasions insensibility partially, or generally, and in a degree proportionate to its quantity. In extreme cases, such as I have cited, the insensibility is manifested by every circumstance. The pupil of the eye is dilated, and cannot be made to contract even by a strong light. The respiration is slow and stertorous, and the pulse proportionately slow and labouring. There is no vomiting, which would indeed indicate sensibility of stomach. The limbs are relaxed, as in a person just dead. No struggles take place, nor signs of sensation appear during the operation; but on the pressure being removed, sensation and intelligence are immediately restored.

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In concussion, the insensible state is of short duration, and during its continuance the body is generally cold, and the pulse feeble and intermitting. Afterwards the skin is hotter than usual, the pulse and respiration more frequent; the former often intermits, and the latter has not the stertor of apoplexy\*. The pupil of the eye is not dilated, but rather contracted. The countenance expresses pain or uneasiness; and vomiting occasionally takes place. The state of the patient is like that of a heavy and uncomfortable sleep; yet, being roused, signs, even of intelligence, appear.

In fractures of the basis of the skull, however, it must be acknowledged, that the symptoms are often deceptive. In general the symptoms resemble those of concussion, yet sometimes a degree of insensibility

\* But the absence of stertor must not be relied on as a proof that there is no compression; for Morgagni relates dissections of apoplectic persons, where the effusion was considerable, yet no stertor had occurred; and I have seen cases where it took place only in a very slight degree.

may be observed like that produced by pressure, when no pressure has really taken place.

I cannot better represent to the reader what I conceive of the value of the distinctions which I have made, between the symptoms of compression and concussion of the brain, in ordinary cases, than by relating briefly some of the particulars of a case sent me by Mr. Davies, surgeon of Tetbury, who was formerly an industrious and intelligent student at St. Bartholomew's hospital. The case also, in my opinion, deserves to be recorded for other reasons, which I shall afterwards mention.

A young woman was knocked down by a blow on her head, and the place where the blow had been received was denoted by a soft swelling of the scalp. She lay in a state of apoplexy, and appeared like a corpse. The pupils of her eyes could not be made to contract by the approach of a strong light; her olfactory nerves were unaffected by the most pungent odour; her ears were equally insensible to sound; she manifested no uneasiness  
upon

upon being sharply pinched; her pulse was small and intermitting, and her breathing scarcely perceptible; and a cold and clammy moisture covered her skin.

Mr. Davies immediately divided the scalp, and finding the bone fractured, he trephined it. There was no blood upon the dura mater, but that membrane was thrust up into the aperture made by the trephine. The dura mater being divided, about five ounces of blood was suddenly discharged, and the patient rose up in bed, as if waking with affright. Her pulse and respiration were soon relieved, and became natural. A plan of treatment calculated to prevent and subdue inflammation was strictly pursued, and the patient did well without any remarkable occurrence taking place.

From what has been already said it may be inferred, that I do not consider the division of the dura mater as a slight evil. It is, doubtless, the duty of a surgeon, when he has been urged to trephine, on account of strong symptoms of pressure, to divide that membrane, if it be thrust upwards into the



aperture which he has made. I have said that frequently the blood is coagulated, or so thickly grumous, that the whole of it cannot be discharged. In the present case, however, the promptitude of the surgeon's conduct enabled him happily to discharge the effused blood whilst it remained fluid.

## SECTION V.

*Inflammation of the Pia Mater\*.*

THE inflammation of the dura mater, which occasionally succeeds to injuries of the head, has been well described by Mr. Pott. Patients labouring under this complaint are feverish, have a constrictive pain in the head, but continue rational, and give a clear account of their symptoms, until matter forms, or inflammation of the internal parts ensues. This is what we might naturally expect from the structure of the dura mater, the manner in which it is supplied with blood, and its vessels having little connection with the brain. When the pia mater becomes in-

\* In the former edition, I related in this section cases of inflammation of the pia mater, in which this disease occurred distinctly, and terminated fatally, in order to authenticate the specific symptoms attendant on it. As many of the foregoing cases, however, are instances of this disease coming on after concussion or fracture, and yet occurring as a distinct disease, and uncombined with symptoms arising from the peculiar nature of the injury, I think a further narrative of cases superfluous.

flamed,

flamed, as the brain derives a considerable portion of its blood through the vessels of that membrane, the disease is instantly communicated to the cerebrum, and deranges its functions. This derangement varies in its nature and degree, accordingly as the inflammation of the pia mater is more or less violent; as it is confined to the surface, or extends to the internal parts; as it produces a greater or smaller secretion of fluid which compresses the brain; or as it is more or less blended with the effects of concussion. The state of the patient will vary considerably under these different circumstances. If the inflammation be violent and general, the patient will be irrational and disturbed, having his mind strongly affected by wrong ideas, and endeavouring to act in consequence of them. If the inflammation be moderate, and affect the surface only, he will be irrational, uneasy, restless, and perhaps endeavour to get out of bed, but without the violence of mania. Should a moderate inflammation be blended with the effects of concussion, he will have less appearance of irrationality, will lie pretty quiet, and inattentive to slight impressions, as  
appeared



appeared in some of the cases related.—I am not able to particularize every variety that may occur in the symptoms; but in all, there must be more or less derangement of the powers, both mental and corporeal, depending upon the degree of inflammation, &c.\* — The symptoms, which chiefly characterize the complaint, are those of an increase of sensibility; the pupils of the eyes are contracted; the patient often withdraws his arm on being touched, and his pulse and tongue denote general as well as local inflammation. It seems of the utmost importance, that those means which in general cure inflammation, should be prosecuted very vigorously at the commencement of this complaint; since otherwise, although they may check, they will not overcome it. Large blood-lettings, brisk purging, and extensive counter-irritation by blisters, ought to be

\* An unusual infirmity of the bodily powers is sometimes observed, accompanied with tremors, low delirium, and exceedingly rapid pulse; yet, on dissection, a slight inflammatory appearance of the pia mater and brain is all that can be discovered. Such a state sometimes occurs after an abscess has formed in the brain.

employed at the very commencement; for, if omitted, the disease will then become established, and the powers of the body will soon be too much sunk to admit of the same active treatment at a later period.

I have here represented the general effects of inflammation of the pia mater when it arises from external violence. In other cases, indeed, where it comes on, as it were, spontaneously, or without any powerfully exciting cause (in which case it generally falls under the care of the physician), it has appeared to have affected the brain but little, and to have been very slow in its progress, and inactive in its nature. In such cases it has produced a deposition between the tunica arachnoidea and the pia mater, or a collection of serum between the former membrane and the dura mater. Under these circumstances, I have learned that the rationality of the patient has been scarcely deranged. And as such a state of disease may occur after an accident, I have thought it right to mention it in this place.

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In the generality of cases of injury done to the head, the symptoms of concussion, compression, and inflammation are so combined as to appear inexplicable. It is only by an attention to those rare cases, in which the symptoms of each appear distinctly, that we are likely to increase our knowledge of their specific effects. I conclude this review of the effect of injuries done to the head, by observing, that whatever may be the nature of the injury which the brain may have sustained, still the disorder induced in that organ must produce a proportionate disorder in the functions of the digestive organs, and the reaction of the latter affection must aggravate the former. Some remarks on this subject are inserted in the first volume of these observations. To corroborate further the statement there given, and to bring this subject before the reader's mind on the present occasion, I relate the following case, which occurred about two years ago.

## CASE XXI.

A young gentleman received a severe wound on the forehead, which laid bare the  
H 2 bone,



bone, and stunned him. By venæsection and the usual treatment, the immediate ill consequences of the injury were mitigated and subdued; so that the wound healed, and he was considered to be convalescent. He was not, however, well; he had strange nervous feelings about his head; and after three months he became very much disordered. Calling at a friend's house, he discoursed wildly, and became so delirious, that they were obliged to confine him in bed by means of a strait waistcoat. Ten ounces of blood were taken from him, and I was desired to visit him. His pulse beat more than 100 in a minute; his skin was hot and dry; his tongue was furred, but it could not be distinctly seen; he shewed no signs of understanding to any questions that were put to him; he rolled his head about; and breathed altogether by means of the ribs, without moving the diaphragm. When I pressed even slightly beneath the ensiform cartilage, he seemed to suffer greatly, and became slightly convulsed. The blood which had been taken from the arm did not indicate inflammation, and I was therefore induced to consider the symptoms

toms as arising from nervous irritation, caused, or aggravated, by disorder of the digestive organs. As it was impossible to get the patient to swallow, we formed two grains of calomel and 10 of jalap into an electuary, by means of a little honey, and besmeared the back part of the tongue with it. The same medicine was repeated after six hours. The second dose produced two copious discharges from the bowels, after which his head was so much relieved, that when I called on him the following morning, he was perfectly rational, and his pulse was tranquil. I then questioned him particularly respecting the kind of pain in his head; and, he told me, that it was not severe, nor accompanied with throbbing; that it was confined to the part which had been wounded, and it was constant. As the purgative medicines had not begun to operate till towards the morning, I thought that their effects might continue, and therefore only advised, that he should take saline draughts in a state of effervescence, during the day; and food of an unstimulating quality. No more

evacuations however took place from the bowels, and in the afternoon the patient again became delirious, so that when I saw him in the evening he did not seem to understand any thing that was said to him. He lay, however, much more quietly than he had done on the preceding evening, only occasionally moving his head to one side or the other, and then seeming as if he was looking for some object by the side of the bed. The jalap was now again given him, with the addition of one grain of calomel. The medicine operated twice in the night, and next morning he was again perfectly rational. We now insured the continuance of discharges from the bowels, by directing him to take some common purging mixtures, if his bowels did not act in six hours. The delirium did not return, and the patient soon became as well as he had ever been since the accident. Yet still his digestive organs were not in a healthy state. His tongue was much furred; his bowels either costive or purged, and generally in the latter state; and the secretion of bile was either deficient in quantity, or faulty  
in



in quality. He remained in this way for many months, though various kinds of medicines were given for his relief. At last a spontaneous diarrhœa occurred, and as I was informed by his physician, his bowels afterwards regained their natural tranquillity and functions.

## SECTION VI.

*Cases of Disease of the Bone and Dura Mater.*

THE diseases of the cranium, and consequent affections of the dura mater, have been well described by some French and German surgeons\*. But as they have not, I believe, been explained by English writers, I shall confirm the accounts which we have received of them by additional cases; and afterwards shall offer some remarks on this subject.

## CASE XXII.

A man, between thirty and forty years of age, was salivated for complaints in his head, supposed to be venereal. There were two tumours of the scalp; one a little before the coronal suture, and the other a little above the posterior superior angle of the left parietal bone. The man's health was greatly reduced by the course of medicine he had undergone,

\* Vide Monf. Louis' Memoire, in the fifth volume of the Mem. de l'Acad. de Chirurgie, and Haller's Disputationes Chirurgicæ.

as well as by the disease, which had considerably increased during the use of mercury. The integuments covering the posterior tumour had ulcerated; and a probe could be passed under them, so as to discover a considerable extent of bare and carious bone. The surgeon, under whose care he was admitted into the hospital, divided the integuments, and perforated the diseased bone, which was found separated from the dura mater. That membrane also had a very morbid appearance, being covered with a soft substance of a dirty reddish colour. On pressing down the dura mater with a probe, to see if it was detached to any extent, nearly a table-spoonful of healthy pus issued from beneath the bone, about an inch behind the part perforated. The surgeon thought this might be sufficient to relieve, and therefore deferred making another perforation. But the man, who had lain stupid, though not irrational, and had *subfultus tendinum* accompanied with great debility, grew shortly after delirious; in which state he continued about two days, when he became convulsed, and died.



On dissection, purulent matter was found on the dura mater, beneath both the carious portions of bone. The membrane also, which was detached, was much thickened, so as in some degree to indent the surface of the brain. The pia mater was generally inflamed; and a larger quantity of fluid than usual was found in the ventricles.

#### CASE XXIII.

An old man was admitted into the hospital for a complaint of giddiness and pain in his head. Upon examination, a tumour was perceived over the left parietal bone, into which an incision was made, and a good deal of matter discharged. The pericranium was found to be detached for three inches in length, and two in breadth. In the middle of the bare bone, which seemed to be dead, and really was so, granulations of a healthy appearance had sprouted out. These arose from the dura mater, and had made their way through the bone. The patient's health, which was moderately good at the time of his admission into the hospital, gradually declined; and, after about six weeks, the pain  
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in his head became particularly severe. From this time he became gradually comatose, took no food, and soon died.

On dissection, the dura mater, beneath the carious bone, was found detached, and had granulated. Much pus lay between the left hemisphere of the brain and the falx; and the whole of the dura mater covering the right hemisphere was lined with healthy pus, which adhered to its surface, and appeared to have been secreted by that membrane.

The cases of diseased bone, which require perforation of the cranium, have not been sufficiently treated of by any English writer. Mr. Pott has, indeed, noticed the disease and death of portions of the skull, that succeed to contusions; but he has not sufficiently explained the affections of the membranes of the brain, which even these diseases sometimes occasion. The circumstance, which seems particularly to have attracted his attention, is the inflammation and suppuration in the diploë, which proceed from injury  
done

done to the bone. The existence of that complaint, however, is easily known; for while there is a fixed pain in that part of the bone, there is no general inflammation, or but very little, of the dura mater. The disease continues, too, a much longer time without producing any seriously bad symptoms, than any disorder of the internal parts could do. When matter is formed in the diploë, the pericranium will certainly separate from the bone, and the external table of the skull will undoubtedly perish. In a case so clearly marked, the conduct to be pursued is obvious, which is, to remove a portion of the external table with the trephine, so as to discharge the matter collected in the diploë, without which no relief can be obtained. I have seen, in several cases where the operation was performed early, that the external table came away within the circle of the trephine, the matter was discharged from the medullary part of the bone, and the internal table remained sound and entire, covering the dura mater. Granulations soon arose, and the patients got well, with the exfoliation only of a portion of the  
outer



outer table. The mischievous consequences of delaying the operation, when once the disease is known, must be evident; for the matter collected within the bone, having no natural outlet, will press on every side, first gradually destroying the diploë, sometimes extending itself over almost the whole of the cranium, and at last occasioning the partial absorption of both tables, so that the skull after death shall be found perforated with a number of holes, like a piece of worm-eaten wood. These holes afford a discharge to the matter, which not only oozes out beneath the pericranium, but also insinuates itself between the skull and dura mater; till at length the patient sinks, worn out by the irritation and fever which this painful and extensive disease creates; unless, as it sometimes happens, he is previously destroyed by inflammation attacking the membranes of the brain.

Suppuration of the diploë, and the death of a portion of the bone, are the common effects of injury done to the cranium; and such a morbid state may indeed occur at some distance

distance of time from the receipt of the injury. But the disease, which the cases represent, generally arises without an obvious cause. An affection of the dura mater is almost the necessary consequence of such a disease in the bone. In syphilis it probably takes place later than in any other instance; for that disorder attacks the outside of the skull, which it gradually destroys; the inner table and the dura mater remain sound till the last. But when, as in the complaint I am now considering, the whole bone is involved in disease, we can no more expect that the dura mater should remain unaffected within, than that the pericranium should continue sound and attached without; for that membrane may be regarded as the periosteum to the internal table of the skull. It is well known that, in general, the dura mater separates, and becomes thickened from a deposition and subsequent organization of coagulable lymph between its layers. This thickening is sometimes considerable, so as to form a tumour which causes an indentation in the cerebrum; as happened in a very remarkable degree in the case of the *Sieur le Gallois*,

related by M. Louis\*. Sometimes the dura mater secretes pus, which being confined within the cranium, produces inflammation of the brain, &c. At others, granulations arise from the irritated membrane, and, making their way through the bone, form those tumours so well described in the Memoir just referred to. This took place in one of the cases I have related; and is a remarkable instance of the power which granulations possess of removing bone. The disease, however, does not confine itself to the part first attacked; for if the irritated state of the dura mater be not appeased, thickenings will take place in other parts of that membrane; or the inflammation becoming more extended, suppuration may be produced even over the opposite hemisphere of the brain, as happened in both the cases which I have related.

I do not mean to say, that in every case of diseased cranium, even where both tables of the skull are equally affected, the perforation

\* See Mem. de l'Acad. de Chirurg. tom. v. It also took place more slightly in one of the cases which I have related.



of the bone is indispenfably required. I know it often happens that the bone exfoliates, without any bad effects having been produced.

But furely no furgeon, who perceives the danger of delay, would hesitate to remove all the dead portion of bone, if fymptoms denoting general irritation of the dura mater take place. The beft event that can be expected, is, that the bone will at length exfoliate without much pain to the patient, or injury to his conftitution. By removing the dead bone, and giving an early and free difcharge to any matter collected beneath it, the irritation which it occafioned will be taken away, the difeafed ftate of the dura mater will gradually fubfide, and healthy granulations arife from its furface; nor will any further difeafe occur in other parts of that membrane. M. Louis tells us, at the conclufion of the Memoir already quoted, in what manner experience had taught him to treat fungi of the dura mater. He fays that “ the whole of the tumour fhould be expofed, “ which cannot happen till the bony circle which

“ which conceals its basis, is removed; and  
“ that afterwards means should be employed  
“ to destroy the fleshy excrescence\*.” Although the destruction of the fungus might be proper for the sake of expedition, and although it can perhaps be attended with no harm, by whatever means effected; yet it may not be necessary. Like other animal fungi, it will probably cease to grow, and soon disappear, when the irritation which occasioned it has been removed.

In cases of tumours rising from within the skull, it is of consequence to determine from what part they proceed. In general, they will be found to spring from the dura mater, and to be the effect of disease in that membrane, induced and kept up by irritation. Surgeons have endeavoured either to reduce them by caustic; to restrain them by pres-

\* The excellent effects of such bold but judicious practice are well shewn in a case related in the 9th Paper of Haller's *Disputationes Chirurgicæ*, vol. i. in which a piece of diseased bone, six inches and a half in circumference, was removed.

sure; or to take them off by a ligature or the knife: and the excrescences have either ceased or continued to grow, according as the irritation which gave rise to them has been removed or not. If the former happened, the surgeon has sometimes attributed undeserved merit to the means he had employed for the cure.

Those tumours which come from within the dura mater, may possibly differ in their kind in different diseases; and of these I have spoken in a former part of this Essay.

What I have written must appear very defective, if it be considered as regarding the effects of injuries of the head in general. But my intention has been only to endeavour to illustrate particular points of practice, by a relation of cases selected from a considerable number of each kind.

I shall next relate a case, in which, though the brain was not the immediate subject of the injury, yet it became affected in consequence



quence of it, and I think the case deserves to be recorded, not only on account of several useful facts and hints relative to practice which it affords, but also because it may eventually tend to throw light on the economy and diseases of the brain.

## CASE XXIV.

A man was gored in the neck by a cow. The horn entered by the left side of the cricoid cartilage, and penetrated as far as the vertebræ; it then passed upwards on the bodies of those bones, nearly as high as the bottom of the skull; afterwards it came out behind the angle of the jaw, exposing, and in some degree injuring the parotid gland in its passage, and lacerating the skin of the face as high as the middle of the ear. In its course it had passed beneath, and torn the internal carotid artery, and all the primary branches in front of the external carotid artery. The former vessel was not, however, entirely rent asunder, so that the general course of the artery, and its connection with the cranium remained in the usual state. Notwithstanding the size of the vessels which had

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been

been torn, they did not immediately bleed; the wound was therefore closed and bound up. The blood was soon observed to flow in streams down the neck, nor could any general pressure upon the wound prevent hemorrhage. In this state the man was conveyed to St. Bartholomew's Hospital, but he had lost a large quantity of blood before his arrival.

The patient was laid upon a bed, and before the wound was opened, one of the students firmly compressed the trunk of the carotid artery against the lower cervical vertebræ. We found upon the first inspection of the wound, that this pressure prevented any hemorrhage; yet upon the occasional motions of the patient, and upon accidental variations in the pressure made on the vessel, the blood gushed from the bottom of the wound so suddenly, and in such quantities, as to prevent any accurate examination. The man was very unquiet; he complained much of the pressure, and was greatly distressed by a sensation of suffocation, which compelled him constantly to attempt to expectorate. Under  
these

these circumstances our first endeavours were to tie the more superficial arteries; but the edges of the wound being lacerated, the first ligatures which we endeavoured to make tore away portions of the flesh, and did not secure the vessels.

The situation of the patient became every moment more desperate, he really seemed choking, his extremities became cold, and his pulse was scarcely to be felt: his struggles also, which could not be controlled, made the pressure on the trunk of the artery very precarious. It was deemed necessary to enlarge the wound to get at the trunk of the carotid artery, and an incision was made between that vessel and the trachea, in a direction parallel to each of these parts. I had now the power of passing my finger beneath the trunk of the carotid artery; and of effectually compressing it between that finger and my thumb, which was placed opposite to it, upon the integuments of the neck.

I had now leisure to examine the wound with my other hand, and felt that the pharynx



had been separated from the vertebræ of the neck, and had fallen against the larynx: the irritation of the latter organ was probably the cause of the sensation of suffocation which the patient suffered. There did not appear any reason to believe that the pharynx was wounded; for though the patient was constantly spitting, the mucus was not mixed with blood. Finding that the moment I remitted the pressure of the carotid, the blood gushed out from so many orifices, and in such a torrent from the bottom of the wound, I resolved to pass a ligature round the trunk of the carotid at the part where I had been compressing it, and which was about an inch below its division. This ligature I thought might be made to serve as the tourniquet in amputation, for I could with it compress the artery so as to prevent the wounded parts becoming obscured by blood, and by slackening it I might gain information with regard to the situation of the ruptured vessels.

Should it become necessary at any time to tie the carotid artery, I am convinced that it may be done without much difficulty or danger,

ger, even without an accurate dissection of the part. If the incision be made on that side of the artery which is next the trachea, where no important parts can be injured, as was done in the present instance, the finger can then be passed behind the artery so as to compress it. The vessel being sufficiently bulky and firm, to make its form and outline distinctly perceptible, a needle may then be passed behind the artery, as near as possible to that edge of it which is next to the internal jugular vein: there can be little risk of wounding that vessel, or of including in the ligature the 8th pair of nerves which lies between them. In attempting to secure the carotid artery, I passed behind it in the manner described, a blunt hook with an eye in the point, and having previously introduced a ligature into it, I drew back the instrument and thus enclosed the artery.

When I compressed the vessel by tightening the knot of the ligature, I did it slowly, and with a watchful attention to the sufferings of the patient; for I cannot but suppose that had the nerve of the 8th pair been included,

cluded, his complaints would have sufficiently denoted that circumstance. But the compression of the ligature did not seem to make the least difference in the general state of the patient, whilst it completely prevented the further effusion of blood. With a knife and dissecting forceps I then exposed the lacerated vessels, and found that the primary branches of the external carotid artery had been torn off from the trunk. By drawing upwards the ligature which encircled the trunk of the artery, I made the internal carotid tense, so that its course and ruptured state could be distinctly felt. The ligature on the trunk was slackened, and the gush of blood further confirmed the laceration of the internal carotid artery. I had now the alternative of securing the ligature, which I had already made on the trunk of the vessel, or of tying the branches separately. I preferred the former, and it should be observed, that the man had now lain ten minutes or more, without any blood being carried to the brain by the left carotid; and during that period he had recovered from his extreme faintness, appeared perfectly sensible, and as well as could



be expected, considering that the person had lost so large a quantity of blood. The ligature being now made secure, the wound was brought together by stripes of plaister; and in this state warm milk was given to the patient to drink, in order to learn what would be the effect of his efforts to swallow, and to ascertain as far as possible, whether there was any wound in the pharynx or œsophagus. The patient swallowed about a quarter of a pint of this fluid with difficulty, and with the frequent excitement of coughing. No milk however came through the wound, and I concluded that all the difficulty of deglutition arose from the unnatural state in which the muscles of the pharynx were placed, in consequence of their detachment from the vertebræ. These circumstances happened between 4 and 5 o'clock in the afternoon, and when I saw the patient again between 9 and 10, his state seemed greatly amended. He had several times taken warm milk, and the difficulty of deglutition had abated. His pulse was now moderately full and strong, and not very frequent. It therefore appeared, that the apparently dying state of the man, which

which at one time had alarmed us, proceeded rather from the sudden discharge of blood, than from the quantity, however considerable, which had been lost. The patient also appeared tranquil, and perfectly rational, and though prevented from speaking much, he expressed himself satisfied in this situation.

On the whole I was led to form a favourable expectation of the progress of the case, as far as related to the effects which a ligature on one carotid would have on the economy of the brain. I was next morning mortified to learn, that the patient had been unquiet and feverish during the night, that he had become delirious, that he had been several times affected by slight convulsions, which had increased; and that when liquids were now given to him, they passed through the wound, and he could scarcely swallow any thing. The pulse of the patient was now about 130 in a minute, and hard, and his skin was hot. He lay inattentive to external objects, but probably not insensible, for the pupils of his eyes were contracted, and when the lids were opened in order to examine them,

them, he shut them quickly, and as it were, impatiently. It had been remarked, that the left side of the body was more convulsed than the right.

As we had it not in our power easily to give medicine, I introduced a small hollow bougie through the right nostril into the œsophagus, and immediately injected half a pint of milk and water, and 60 drops of tincture of opium; that I might learn the effects of that medicine under the present circumstances. The patient shortly after broke out into a most profuse sweat, and the convulsions were quieted by the opium. The convulsions, when thus mitigated by opium, might be described as violent tremors of the left side of his body, but the right side remained motionless; to which curious fact I particularly attended. I placed his right arm across his breast, from which situation it did not afterwards stir. I could not, however, perceive any distortion of the face to the opposite side, and the pupils of both eyes were equally contracted. When I saw the  
sweat



sweat break out on the taking of opium, and the nervous irritation diminish by its operation, I was then more forcibly struck than I had been before with the similarity of this patient's situation, to that of a person suffering from the effects of concussion of the brain, some time after the accident, when the inflammation often succeeding to it had begun to take place.

I even questioned if it might not be right to take blood from the temporal artery, which was seen beating violently. I thought, however, the general opinion would be against such practice, and I only applied a blister to the head. Twenty drops of tincture of opium were directed to be given to the patient every third or fourth hour, with a view to mitigate the convulsions, which it appeared to do. Milk and water was also occasionally given, in proportion to the degree of perspiration. No remarkable change of symptoms took place, but the strength of the pulse gradually declined, and at 10 o'clock at night he had a severe convulsion fit, and  
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immediately after died. His death happened about thirty hours after the ligature had been made on the carotid artery.

The body was examined on the following day. The brain appeared to have suffered a considerable degree of inflammation. The vessels of the pia mater appeared as if they were injected, and in many places upon the surface of the convolutions of the cerebrum, there even seemed an effusion of blood producing that appearance usually termed blood-shot. There was a very considerable deposition of gelatinous substance between the tunica arachnoidea, and the pia mater. The vessels passing through the substance of the brain, though fuller than common, were not particularly turgid. A considerable quantity of water of a light brown colour, and slightly turbid appearance, was found in the ventricles, whilst the firmness of the sides of those cavities sufficiently indicated that the collection had not preceded the accident. On examining the neck, the carotid artery was found to be the only part included in the ligature. The superior thyroideal, lingual

gual and facial branches of the external carotid, were torn off from the trunk, and the internal carotid was rent across, as has been already mentioned.

Neither the trunk of the 8th pair of nerves, nor the great sympathetic, nor those of the tongue, appeared to have suffered injury. The superior laryngeal, and the descending branch of the 9th pair, were the chief nerves injured by the accident. These circumstances are mentioned to enable the reader to form his own judgment on the probability of the symptoms which occurred being produced by nervous injury or irritation.

That the disorder and death of this man are not to be attributed to the quantity of blood which he had lost, appears clearly to me, not only from the degree of plenitude and power of the vascular system which remained, but because I had seen many patients in the hospital, who had divided most of the primary branches of the external carotid artery in the attempt at suicide ; and who,



after surviving a few days, perished in consequence of the loss of blood which they had sustained, but with a train of symptoms very different from those which occurred in the present instance.

Some persons may, perhaps, be inclined to attribute inflammations of the brain to nervous injury or irritation. I have taken notice of all the injury discoverable by dissection, and have further to observe, that we frequently see larger nerves lacerated in wounds without the production of such symptoms, and the tranquil state of the patient, till the inflammation of the brain came on, opposes such an idea. Upon reflection, I can form no other opinion of the case than that which first struck me, which is, that though the stopping the supply of blood to the brain did not for several hours produce any apparent derangement in the functions of that organ, yet such a state was gradually occasioned by it, and which was attended like the effects of concussion of the brain, with inflammation. It further appeared, that when the combined effects resulting from the  
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derangement, and the inflammation were manifested together, the state of the patient much resembled that of a person who had suffered concussion. Miasmata which impair and disturb the energies of the brain, occasion fever and inflammation of that organ, so that there appears to me nothing wonderful in the inflammation which occurred in the present instance. It is right, however, to mention, that the carotid artery has been since tied in this city, by Mr. Travers, without such effects as I have described taking place.

Mr. Travers has obligingly communicated to me the following particulars of this case, which I here insert :

“ The case to which you refer, I consider  
“ to be an example of the disease which  
“ Mr. J. Bell has denominated Aneurism by  
“ Anastomosis. It was a tumour, resembling  
“ the Nævus, of a livid colour, and  
“ compressible, projecting from the orbit,  
“ pulsating formidably, and gradually working  
“ the eye out of its socket. Pressure  
aggravated

“ aggravated the pulse, and gave insupport-  
“ able pain. In examining it, I put my  
“ thumb on the carotid of the same side,  
“ and the pulse instantly ceased. Seeing  
“ that it grew fast, I prevailed on the patient,  
“ a women of eight-and-thirty, to allow me  
“ to tie the common carotid artery, which  
“ I did last May twelvemonth. She suffered  
“ nothing more than I have usually seen  
“ follow other operations for Aneurism, and  
“ was abroad at the end of a month. The  
“ tumour ceased to pulsate, but for some  
“ time retained a vibratory thrill, which it  
“ has since totally lost. It likewise shrunk  
“ to about half its former size, and became  
“ solid and incompressible, in which state  
“ it has since remained. I may also add,  
“ that the patient was greatly afflicted with  
“ pain in the head prior to the operation, and  
“ that it has completely removed that pain.”

The different states of the two sides of the body, in the case which I have last related, ought not, I think, to pass without further notice. Although the right side, could not be positively said to be paraly-



tic, yet, in my opinion, it approached to that state.

It has been already observed, that a double construction might be put upon the symptoms; yet as the inflammation of the brain was equal on both sides, we might naturally expect the whole body to suffer equally. Should the state of the right side have been, as appears most probable, an approach to a state of paralysis, it must surely be considered as peculiarly curious. An effusion of blood in the left hemisphere of the brain would affect the opposite side of the body in the same manner, that cutting off the supply of blood to the left side appears in this instance to have done. I forbear to speculate on this subject: the fact which I have mentioned seems to deserve notice, and though at present it must stand alone, it may receive future confirmation, and when thus supported, be applied to the elucidation of physiology.

I have thought it right to record this case, not merely because it is curious, but  
because

because it affords some useful practical hints, as to the conduct to be pursued when a person has divided the large primary branches of the carotid artery in an attempt at suicide. It may be allowable also to mention, in relation to this latter subject, the great advantages which appear to me to arise from the immediate introduction of a small elastic catheter, passed through the right nostril, down the œsophagus, nearly as far as the stomach, (in the manner practised by Deseault, in the cure of a person wounded by a pistol ball,) when the pharynx or larynx are injured.

A patient in such a state is not under the necessity of frequently swallowing nourishment, which act tears open the wounded parts, and causes inflammation in them, and produces such a secretion of mucus as excites almost constant cough, increasing the disturbance of the wounded parts.

The introduction of a small elastic catheter may be easily accomplished in the first instance, though not without difficulty, after

the sensibility of the parts has been increased by inflammation, and from the benefit I have seen derived from it I should not hesitate to do it in all cases of extensive wounds of the throat.



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## SURGICAL OBSERVATIONS.

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### ON THE ILL CONSEQUENCES SOMETIMES SUCCEEDING TO VENÆSECTION.

THE public is much indebted to Mr. Hunter for a judicious account of the appearance and effects of the inflammation of the vein, which sometimes succeeds to venæsection. The ill consequences which occasionally follow that operation are numerous and dissimilar; and they have never I believe been clearly and collectively stated and explained. The cases recorded of such complaints are dispersed in various periodical publications; and frequently, the nature of the disease appears not to have been understood by the person who relates its history. In proportion as I have seen more varieties of these diseases, my own knowledge of them has

become more clear and simple; and as I believe, I can communicate useful information, I have ventured to offer to the public the following observations and opinions. I have been also incited to this task, because the account in his System of Surgery, which Mr. Benj. Bell has given of these complaints, appears to me confused; and the practice recommended improper. I am hurt to censure the works of any author, but this either must be done, or injurious error must remain uncontradicted.

When from want of attention, or from other causes, the wound inflicted in venæsection does not speedily unite, the motions of the arm occasion attrition of its sides against each other, and inflammation of the wounded, or contiguous parts, is likely to ensue. I shall give a brief account of these different complaints, in the order in which I believe they most frequently happen.

*Of Inflammation of the Integuments, and adjacent cellular Substances.*

The inflammation and suppuration of the cellular substance in which the vein lies, is  
the

the most frequent occurrence. Of this every surgeon must have seen repeated instances; they may also have remarked, that on the subsidence of this inflammation, the tube of the vein is free from induration: neither does the state of any of the surrounding parts indicate their previous participation in the disease. The nature of every excited inflammation will vary as the cause which produced it, and the constitution of the patient shall determine; it will therefore be unnecessary to particularly notice the varieties of its appearance. Sometimes the inflammation will be more indolent, and will produce a circumscribed and slowly suppurating tumour. Sometimes it will be more diffused, partaking more of the nature of erysipelas: and sometimes its violence, and rapid termination, will evidently distinguish it to be a phlegmon.

If the lancet with which the patient was bled should have been bad; if it lacerated rather than cut the parts through which it passed; if the constitution of the patient be irritable; and more particularly, if sufficient attention be not paid to procure the union of the divided parts, but the motion of the



arm be allowed: the irritation, which the friction of the opposite edges of the wound must occasion, will most probably excite inflammation. The treatment proper to be pursued in this complaint is manifest, and distinguished by no peculiarity; I shall therefore postpone what I have to say on that subject, until I have noticed the other varieties of these diseases.

*Of Inflammation of the absorbing Vessels.*

The next frequent complaint which I have seen is inflammation of the absorbents: it however sometimes accidentally happens, that one surgeon meets with many cases of a similar nature, so that were he to judge merely from his own observation, he might conclude that disease to be common, when the collected experience of others would determine it to be a rare occurrence. I am inclined to suspect, that my observation has been thus partial, since Mr. Hunter has not publicly noticed this complaint. I think I cannot give a better history of the commencement, appearances, and event of this disease, than by relating three cases, of the  
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circumstances of which I took an account. It is right, however, to mention, that I have seen two others, of which I took no minutes; and which I am unwilling to relate only from recollection.

### CASE.

A lady was bled in the vena mediana basilica; the wound did not heal, nor was sufficient attention paid to preserve the arm quiet. Eight days afterwards, I was consulted, in consequence of the patient being alarmed, by the appearance of two swellings; one was situated about the middle of the arm, over the large vessels, the other on the forearm, about the mid space between the elbow and wrist, in the integuments above the flexor muscles. The upper swelling measured rather more in circumference than an egg, the other was of smaller dimensions; they were not very painful, they were moderately firm in their texture, and so exactly resembled those tumours which form round irritated lymphatics, that no doubt could be entertained of their nature. The orifice made by the lancet was not healed, the integuments for about one-fourth

fourth of an inch surrounding it, were in a slight degree inflamed, and thickened. No induration of the venous tube could be distinguished, either at this time, or after the subsidence of inflammation.

The account which I obtained from the patient, of the attack of this complaint, was, that the wound inflamed, became painful, and discharged matter; that the gentleman by whom she was bled had dressed it with salve, but did not restrain her from using her arm; that about five days after the operation, she had felt pains shooting from the orifice, in lines, up and down her arm, and upon pressing in the course of this pain, its degree was increased. This account induced me to examine the arm attentively, and I could plainly feel two indurated absorbents, leading to the superior tumour, but could not perceive any extending to the lower one. The wounded part was dressed with mild salve; a bread and milk poultice was applied to both tumours, and the arm was supported by a sling, and retained without motion or exertion. The integuments surrounding the orifice lost their disposition  
to



to inflame, and the wound gradually healed ; during five days, the tumours underwent no evident alteration ; the poultice was changed to one of bread, water, and a solution of acetate of lead, under which they quickly diminished and dispersed.

#### CASE.

A man about 35 years of age, was admitted into St. Bartholomew's Hospital, under the care of Mr. Pott : he had been bled in the country, about a fortnight before his admission ; since that time he had been extremely ill, and was with difficulty conveyed to London. The state in which he was admitted, I shall describe : His whole arm was greatly swollen, the wound made by the lancet was not united, the parts immediately surrounding it did not seem to be affected by distinct inflammation ; but partook of the general tumefaction. Two large abscesses had formed, one situated near the inner edge of the biceps muscle, about the middle of the arm ; and the other, on the inside of the fore-arm. The patient told us that he had been bled, on account of a pain in his side ; that the orifice, instead  
of

of healing had festered, that he had for a time pursued his daily employment, notwithstanding the pain which he suffered; that this, however, soon became too violent to be endured; the swelling and pain extended towards the armpit, where the glands became enlarged. Inflammation next attacked the forearm, and after suffering extreme pain and fever, these abscesses had formed, and since that time his illness and pain had in some degree abated. Mr. Pott opened both abscesses, and directed his whole arm to be covered with a poultice. The patient was kept in bed, and medicines likely to alleviate inflammation were prescribed. In about four weeks, the arm was reduced nearly to its natural dimensions. The orifice, through which he was bled, had united, and the wounds by which abscesses had been opened were nearly healed. The parts surrounding them, however, still remained thickened, and also all the integuments on the inside of the arm. In these thickened integuments, three-chord-like substances, evidently absorbents, were to be distinguished; they extended from the punctured part to the superior abscess,

and again above this, two were continued even to the axilla. Two other indurated absorbents also were extended from the punctured part to the inferior abscess. The punctured vein being attentively examined, was found to be a little thickened, both above and below the orifice; it had, however, no connection with these chord-like substances, which were superficial, and their appearance, course, and every other circumstance, clearly shewed them to be indurated absorbents. The hardness of these vessels, and of the integuments had much diminished, and the patient had regained the strength of his arm, before he was discharged from the hospital.

#### CASE.

A poor man was bled, in one of the bleeding-shops of this city. His operator dipped some rag in the blood which he had taken, applied it to the orifice, and bound it on the arm with a tape. The patient felt much pain in the wound, even from the time of the operation, and experienced much difficulty in moving his arm. As the rag stuck closely to the orifice, he was unwilling to remove



move it; however, on the third day, the violence of the pain induced him to take it off; he then found the parts furrounding the puncture inflamed and hardened. The patient had also suffered much pain, which extended towards the axilla, and one of the glands there was swollen. He anointed the arm with some ointment, but the pain so increased, that he could scarcely bear it to touch his side. The integuments about the middle of the arm were elevated by a tumour, which was painful when pressed; the base of it was not circumscribed, but was gradually lost in the surrounding parts. In this situation he requested my advice. I gave him some mild salve to dress the wounded part; I directed him to keep constantly applied to the integuments, covering the inflamed lymphatics, some cloths wetted with the cold solution of acetate of lead, to keep his arm completely supported by a sling, and to take some gently purgative medicine.

This he did, the inflammation gradually subsided; and the wound made by the lancet healed.

It might be suspected, that in the cases which have been related, the lancet which was employed was envenomed; and that the absorption of virulent matter was the exciting cause of inflammation: the descent of the disease to the inferior absorbents, in the two first cases, opposes that opinion; and it is further invalidated by the observations which I shall proceed to offer. Since the structure and functions of the absorbing vessels have become so well known, the attention of medical practitioners has been directed to their diseases, and much novel information has been acquired. That which relates to the present subject, I shall endeavour briefly to state. Physiology shews to us, that the absorbents possess much sensibility. Practical observation strengthens this opinion: the celerity with which these vessels inflame, when they have imbibed noxious matter, and the pain which is suffered in consequence, sufficiently prove this circumstance. Their frequent inflammation, in consequence of disturbance of the general constitution, may be however regarded as an additional argument. A common cold produces

duces a painful tumefaction of the absorbent glands; and in some fevers, these parts are particularly obnoxious to disease.

There is another circumstance, which deserves attention; when the absorbents become inflamed, they quickly communicate this disease to the cellular substance, by which they are surrounded. Most surgeons have remarked these vessels when indurated, to appear like small chords, perhaps of one-eighth of an inch in diameter; this substance is surely not the slender sides of the vessel thus suddenly augmented in bulk, but an induration of the surrounding cellular substance, to which the irritated vessel has communicated inflammation. The formation of a common bubo is another instance of the power, which these vessels possess, of involving the surrounding parts in their disease; at first one or two glands are found to be inflamed, but they soon become undistinguishable, in the general inflammation of the surrounding substance. This inflammation either is dispersed, or it terminates in suppuration: and on the subsidence of the  
general



general tumour, the originally diseased glands again become distinguishable.

I now wish to shew, that their inflammation, in consequence of local injury, is deducible from two causes : one, the absorption of acrid matter ; and the other, the effect of irritation of the divided tube. Of the inflammation arising from the absorption of morbid matter, every one is apprized ; but that which is the effect of irritation, has been less remarked.

When virulent matter is taken up by the absorbents, it is generally conveyed to the next absorbent gland ; where, its progress being retarded, its stimulating properties induce inflammation ; and frequently no evident disease of the vessel through which it has passed can be distinguished. The absorption of syphilitic and cancerous matter affords frequent proofs of this assertion. There are, indeed, some poisons so acrid, that the vessel which admits them inflames throughout its whole extent ; yet still the glands are principally affected. When inflammation of

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the absorbents happens in consequence of irritation, that part of the vessel nearest the irritating cause generally suffers most: whilst the glands, being remotely situated, partake less of the inflammation. The inflammation is also of a different kind, and, I think, can be discriminated: when it arises from poison arrested in the part, the gland is first indurated, and a phlegmonoid inflammation follows; but if irritation be the cause of its enlargement, the tumefaction more speedily takes place, the gland is more painful in its early state, but has less tendency to suppurate; the enlargement more resembles that of the lymphatic glands of the neck, which is the consequence of taking cold.

When the inflammation arises from irritation, it will be expected, and I believe it will be found, that the continuity of the vessel will be apparent: but it does not follow, that the greatest disease will be immediately adjoining that part which has sustained the injury. The cases which have been related shew that inflammatory tumours often form in the middle of the arm and forearm,

when the wound of the absorbent is at the bend of the elbow. Were it necessary, I could relate several cases where such tumours were formed from injuries done to the fingers, or in consequence of fretting ulcers of the leg. When they arise from the latter cause, it might be supposed that some acrid matter had been imbibed; yet, I think, in that case, we should find the glands the principal seat of the disease. It has been proved, that the absorbents frequently inflame far below the part where the vessel has sustained an injury, and where the inflammation could not be occasioned by absorption. These observations I thought it right to insert, to illustrate the cases which have been related; and also to excite more general attention to the diseases of these important vessels.

### *Of Inflammation of the Vein.*

After the account which Mr. Hunter has given of the inflammation of the vein, (in the Medical and Chirurgical Transactions) no additional information from me will be expected, nor is it perhaps required. If the wound of the vein does not unite, an inflam-



mation of that vessel will probably follow; which will vary in its degree, in its extent, and in the course which it pursues. One degree of inflammation may occasion only a slight thickening of the venous tube, and an adhesion of its sides; more violent inflammation may be attended with the formation of more limited, or more extensive abscesses; the matter of which may sometimes mix itself with the circulating fluids, and produce dangerous consequences: or it may be circumscribed by the thickening and adhesion of the surrounding parts, and then like a common abscess make its way to the surface. When the inflammation of the venous tube is extensive, it is, indeed, very probable, that much sympathetic fever will ensue; not merely from the excitement which inflammation usually produces; but also, because irritation will be continued along the membranous lining of the vein to the heart. If, however, the effect of the excited inflammation has luckily been to produce adhesion of the sides of the vein, at some little distance from the wounded part, the inflammation will here cease; its further transmission will  
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by the adhesion be prevented. The effect of adhesion of membranes, in preventing the extension of inflammation along their surfaces, is frequently apparent, and has been well explained by Mr. Hunter on another occasion. In one case, Mr. Hunter applied a compress on the inflamed vein, above the wounded part, and he thought that he succeeded in producing adhesion, for the inflammation extended no further. In those cases, where the inflammation does not continue equally in both directions, but descends along the course of the vein, it is probable that its extension in the other direction is prevented by adhesion.

I have thus briefly and imperfectly transcribed Mr. Hunter's opinion, that the present Essay might not be altogether deficient in information relative to this subject. I have seen but three cases where an inflammation of the vein succeeded to venæsection; they, however, confirm the foregoing observations. The vein did not in either case evidently suppurate. In the first, about three inches of the tube inflamed both above and

below the orifice; it was accompanied with much tumour, redness, and pain of the covering integuments, and much fever, the pulse was rapid, and the tongue furred. After the inflammation had terminated, and all tumour had subsided, the vein did not swell when compression was made above the diseased part. The second case was of a similar nature, but less in degree. In the third case, the inflammation was not continued in the course of the vein towards the heart, but extended as low as the wrist. I have no doubt, but that adhesion of the sides of the vein was the cause which prevented the extension of the disease, equally in both directions. The nature of a disease being known, the treatment is commonly evident. The diminution of inflammation in a vein is to be attempted by the same general means as in other parts. As the membranous lining of the vein is continued to the heart, and as inflammation very speedily spreads along such surfaces, unless prevented by adhesion; the application of a compress at some distance from the punctured part, in order to unite the inflamed sides of  
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the vein, appears to be particularly judicious.

I am induced to suppose, a case may occur in which the vein may suppurate, and in which a total division of the tube may be proper practice; not merely to obviate the extension of the local disease, but to prevent the collected pus from mixing with the circulating fluids.

*Inflammation of the Fascia of the Forearm.*

As far as my observation has extended, the next frequent ill consequence which succeeds to venæsection performed in the arm, is an inflammation of the subjacent fascia. When this complaint occurs, it perhaps arises not merely from the contiguity of the fascia to the punctured and irritated parts, but it is probable that it was wounded by the lancet in the operation. I hope that the cases which I shall relate, and those to which I can refer the reader, will convey sufficient information of the symptoms and effects of this disease.

## CASE.

A man, aged 40, was admitted into St. Bartholomew's Hospital, under the care of Mr. Pott: he had much pain and difficulty of moving his arm, in consequence of inflammation, succeeding to phlebotomy. The wound inflicted in the operation was not healed; the surrounding integuments were not much inflamed, but he could neither extend his forearm nor his fingers without great pain. The integuments of the forearm were affected with a kind of erysipelas; when slightly touched, they were not very painful, but when more forcibly compressed, so as to affect the inferior parts, much pain was suffered. The patient complained of pain, extending towards the axilla, and also towards the acromion, but no tumour of the arm in either direction was perceptible. A poultice was applied to the arm, opium was given at night, and aperient medicines were occasionally prescribed. The pain in the arm increased, and it was attended by much fever. After a week had elapsed, a small and superficial collection of matter  
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took place a little below the internal condyle; this being opened, but little pus was discharged, and scarcely any decrease of tumour or pain followed. About ten days afterwards, a fluctuation of matter was distinguished below the external condyle; an incision was here also made, which penetrated the fascia of the forearm. Much matter immediately gushed from the wound, the swelling greatly subsided, and the future sufferings of the patient were comparatively of little consequence. This opening was, however, inadequate to the complete discharge of the matter, which had probably been originally formed beneath the fascia in the course of the ulna; its pointing at the upper part of the arm, depended on the tenuity and comparative non-resistance of the fascia at that part. The collected pus descended to the lower part of the detached fascia, a dependent opening for its discharge became necessary, after which the patient recovered, without any circumstance being observed worth relating. The case which I have just related, and that in which two large abscesses had formed, attended with in-



durated absorbents, occurred nearly at the same time at the hospital, and they both fell under the care of Mr. Pott. In the lectures of that eminent surgeon, I had heard dangerous and fatal consequences attributed to the injury of a nerve in venæsection, but I learned no other distinction of cases. These cases first excited my attention to this subject, and as far as I know, such discrimination as that which I now offer to the public has not been attempted.

I have seen one other case of inflamed fascia, but I neglected to take notes of the symptoms; I therefore can only say, that at the time they appeared so clearly to characterize it, that I entertain no doubt of its nature. No inflammation of the vein or absorbents appeared, the integuments were not much affected, but the patient complained that his arm felt as if bound or compressed, and that he suffered much pain if he attempted to extend it. The inflammation subsided without the formation of matter; and after much time had elapsed, the pliability of the arm was gradually regained. I the less regret  
my

my deficiency of experience on this subject, as I can refer the reader to the second volume of the Medical Communications; he will there meet with two cases, which I believe he will acknowledge to be inflammations of the fascia; attended, however, with some peculiarity of symptoms.

The first case is related by Mr. Colby of Dorrington, in Devonshire; the other by Mr. Watson. The inflammation of the fascia, in the latter case, was followed by a permanent contraction of the forearm. From this case, I think we have acquired useful knowledge: should a similar contraction of the forearm from a tense state of the fascia in future occur, it seems reasonable to suppose, that it may be completely relieved by detaching the fascia from the tendon of the biceps, to which it is naturally connected. This, I conclude, was the cause of the perfect restoration of free motion, in the case first related by Mr. Watson. On this subject I will not enlarge, but submit the opinion to the judgment of the reader.

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The treatment of an inflamed fascia, the consequence of venæsection, has in it no peculiarity. Doubtless, those general means which are reductive of inflammation should be employed. Of local treatment, quietude of the limb, and a state of relaxation of the inflamed part, will tend to lessen disease; but as soon as some abatement of inflammation is procured, the extension of the forearm and fingers ought to be attempted, and daily performed, to obviate that contraction which might otherwise ensue.

*Of the ill Consequences succeeding to a wounded Nerve.*

In order to complete, in some degree, this Essay, I have attempted to discuss the present subject; though, I acknowledge, I have no practical information to communicate. I believe these accidents to be of rare occurrence, since those of my medical friends, to whom I have applied for information, had never seen a case, the symptoms which they could decisively pronounce to arise merely from an injured nerve. Mr. Pott in his lectures used  
to



to say, that he had seen two cases in which the patients had suffered distracting pain, which was followed by convulsions, and other symptoms which could only be ascribed to nervous irritation. He attributed these effects to a partial division of the nerve, and recommended its total division as a probable remedy. Dr. Monro, I am informed, relates similar cases, in which such treatment has proved successful. I rely on the discrimination of these eminent men, yet I feel convinced, that the greater number of surgeons have been deficient in distinguishing these diseases. A wounded nerve, acting as a cause, must always produce specific and characteristic symptoms and effects. I need not insist on the necessity of discrimination in these complaints; those who have described the symptoms resulting from an injured nerve, have represented them as at all times imminently hazardous, and frequently fatal. An operation is here demanded; from it we have reason to expect immediate mitigation of the patient's sufferings, and his future perfect restoration. Yet this operation in any other  
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of the complaints before treated of would be unnecessary, and perhaps detrimental.

I shall arrange what I have to say on this subject in the following manner: First, I shall explain what nerves are subject to injury; secondly, I shall investigate what are the effects likely to be produced by such an accident; and thirdly, I shall enquire, what means are most likely to afford relief.

First, The two cutaneous nerves are those which are exposed to injury. I dissected them in several subjects with attention, and found some irregularity in their distribution; most frequently all their branches pass beneath the veins, at the bend of the arm; but sometimes, although the principal rami still go beneath these vessels, many small filaments are detached before them, which it is impossible to avoid wounding in phlebotomy. As I believe many surgeons retain but an indistinct remembrance of these nerves, and as I have never seen them accurately depicted, in any anatomical book, I thought I should  
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do an acceptable service, by giving an engraving of them. I therefore made two drawings of them: one exhibiting their most simple course; the other, their most complicated distribution. These, I conclude, are the only nerves liable to injury: it may be suspected, that the median nerve might occasionally be wounded; but its situation, I think, makes this opinion improbable. If, however, a doubt should be entertained on this subject, an attention to symptoms will soon dispel it; when a nerve is irritated at any part between its origin and termination, a sensation is felt as if some injury were done to the parts which it supplies. If, therefore, the cutaneous nerves were injured, the integuments of the forearm would seem to suffer pain; but if the median nerve was wounded, the thumb and two next fingers would be affected with pain.

By referring to the plate, it will be seen, that if the patient be bled in the vena mediana basilica, the branches of the internal cutaneous nerve are exposed to injury; or, if the vena mediana cephalica be opened, the  
branches



branches of the external cutaneous nerve may be wounded.

Secondly, I wish to enquire what are the ills likely to arise from a wounded nerve. — Whoever reflects on the wonderful minuteness of the nervous fibrils, and considers their perfect distinctness from each other, although connected by a common covering of cellular substance, will scarcely imagine a partial division of a nervous fibril. If I sought to express myself strictly on this subject, I should speak of a partial division of a packet of nerves. But I shall use the commonly adopted language, and call those chords nerves, which are really composed of multitudes of separate nerves. I first beg leave to examine the opinion which has prevailed, of a nerve being partially divided. Admitting that a nerve be partially divided, would it not, like a tendon, or any other substance, unite? I think there can be no doubt but that it would: I am induced to this opinion by considering, that nerves of equal size with the cutaneous nerves of the arm are distributed in considerable numbers throughout

out the body. In the many operations performed, and in the wounds daily occurring, I think it would be strange if a partial division of a nerve should not happen, yet no peculiar symptoms are observed usually to ensue. The pain which some people suffer from bleeding, in my opinion, indicates an injury done to a nerve. If the reader refers to the plate, he will perceive, that in some cases it is impossible to avoid dividing branches of nerves in phlebotomy, as sometimes they pass before the vein. These branches are so exposed, that I should be surprised if they did not many times suffer a partial division. Surely, however, a half divided nerve would unite without causing a general derangement of the nervous system. Yet it is possible that an inflammation of the nerve may accidentally ensue, which would be aggravated, if it were kept tense, in consequence of imperfect division. In the cases related by Mr. Pott and Dr. Monro, I believe, that some days elapsed after the infliction of the injury, before any alarming derangement of the nervous system ensued. Inflammation of

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the furrounding parts also appeared. These observations make it evident to me, that the disease consists in inflammation of the injured nerve, in common with the other wounded parts; and this inflammation, I can conceive, to happen with or without a total division of the nervous chord. I should consider a case of inflamed nerve as an object of great curiosity; every one, I think, will admit, that it is likely to communicate dreadful irritation to the sensorium; and every one will perceive, that a cure will probably arise from intercepting its communication with that important part.

Thirdly, I proceed to enquire what is the most probable method of relieving the effects arising from an inflamed nerve. The general opinion is, that the nerve is only partially divided, and that a total division would free the patient from a continuance of his sufferings. Mr. Pott supposed that the wounded nerve was situated at one or the other extremity of the wound which had been made in the vein; he therefore proposed, to divide it totally, by enlarging a little the original orifice.

It



It is however possible, that the point of the lancet might injure a nerve lying beneath the vein. This will be easily understood by referring to the plate. Mr. Bell directs an extensive transverse incision, to be made through the original wound; but if the injured nerve be situated at the upper extremity of the orifice, it will remain unaffected by this operation. Mr. Bell also advises the incision to be continued to the bone; but this appears to me dangerous and unnecessary.

If the injured nerve be inflamed, I think it doubtful, whether even a total division of it, at the inflamed part, would effectually relieve the general nervous irritation which the disease has occasioned. To intercept the communication of the inflamed nerve with the sensorium, does however promise perfect relief. This intention can only be accomplished, by making a transverse incision above the orifice in the vein. The incision need not be very extensive, for the injured nerve must lie within the limits of the original orifice, and it need only descend as low as the fascia of the fore-arm; for all the fila-

ments of the cutaneous nerves lie above this fascia. The vein which had been opened, and some filaments of the cutaneous nerves, are all the parts of consequence which will be divided in this operation. The proximity of the division of the nerve to the vein, must be regulated by the supposed extent of the disease. However, as the extent of the inflammation of the nerve is uncertain, I submit it to the consideration of surgeons, whether it may not be adviseable, in some cases, to divide either of the cutaneous nerves, still more remotely from the injured nerve.

I find little difficulty in detecting the trunk of these nerves in the dead subject, and I should suppose but little would occur in the living state; for the compression of the tourniquet, would prevent any obscurity which hæmorrhage might cause.

*Explanation of the Plate.*

- A Vena basilica.
- B Vena cephalica.
- C Vena mediana.
- D Vena radialis.
- E Vena cubitalis.
- F Vena mediana basilica.
- G Vena mediana cephalica.
- H Nervus cutaneus internus.
- I Nervus cutaneus externus.



*General Observations on the ill Consequences  
sometimes succeeding to Venæsection.*

I think it very probable that these diseases would less frequently happen, did not the situation of the veins usually opened contribute to their occurrence. The common offices of life so constantly demand the employment of the arm, that its motion becomes almost inevitable. Unless the orifice made by the lancet has been attentively closed; the effect of this motion will be to separate the edges of the wound from each other, and to prevent their union by the first intention. Some slight degree of inflammation will ensue; the continuance of motion of the arm causes a friction of the inflamed surfaces against each other, and thus the disease is increased. Under these circumstances, if the constitution of the patient be irritable, the inflammation will extend itself, although it may still be confined to the cellular substance, and integuments; or, perhaps, it may be transmitted to that part which has sustained most injury in  
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the operation. The vein, the absorbents, the fascia, or the nerve, may in that case suffer peculiar disorder. Although the injury done by a bad lancet may contribute to the production of disease, yet I think it probable, that a patient improperly bled, would sustain no injury, if the treatment of the wound was judicious; whilst another, on whom the operation had been dexterously and well performed, would be liable to these ill consequences, if the proper attention to unite the wound was neglected.

In the account given of these diseases, they have been represented as they occurred separately; doubtless, in some cases, they may be combined.

The principal curative indications appear to be, to mitigate the inflammation about the orifice, and to preserve the arm supported in a motionless state. I need not enlarge this account, by describing the modes of appeasing inflammation and irritation, as they are well known to every surgeon.





# SURGICAL OBSERVATIONS.

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## ON EMPHYSEMA.

MUCH praise is, in my opinion, due to Mr. John Bell, for the clear and spirited description which he has given of the state of the lungs in one kind of emphysema. The following case is related, to corroborate his remarks, and also to lead to others which I am desirous of offering to the public on the subject of emphysema in general.

### CASE.

A poor woman, about forty years of age, was run over by a mail-coach, one of the wheels of which passed lengthwise over her back, and fractured several of her ribs on the right side. When brought to the hospital, she breathed with much difficulty, and an

emphysema of the integuments had taken place. An opening was made through the skin to let out the air; and the emphysema did not afterwards spread. The patient was bled largely; but the difficulty of breathing had increased to the third day, at which time I first saw her, in company with Mr. Harvey, under whose care she was. She had passed the preceding night without the least sleep, and breathed at this time with extreme difficulty; indeed it seemed as if she could not long continue the labour of such imperfect and distressful respiration. It was supposed that one side of the thorax was filled with air; and as it was suspected that the opposite lung might be oppressed by this cause, it was agreed to extract the air from the right side of the chest. With this view, Mr. Harvey made an opening into the thorax, in the following manner: He first made an incision about two inches in length, through the integuments, near the middle of the seventh rib, and opposite to its lower edge. He then drew the skin upwards, so as to expose the intercostal muscles which connect the upper edge of this rib to the one above it. These

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he cautiously divided, as he next did the pleura. At the time this was effected, I believe the patient was in the act of expiration; for a blast of air evidently issued from the thorax; and afterwards, whilst the integuments were kept retracted, and the aperture in the pleura consequently uncovered, the external air continued to rush in during the enlargement of the thorax, and to be forced out again during its contraction. But when the divided skin was allowed to descend to its natural situation, and thus the opening of the pleura was covered, no farther passage of air took place; and all that could then be perceived, was a depression of the integuments opposite to the aperture in the thorax, occasioned by the pressure of the atmosphere during the enlargement of that cavity. I had got ready a large injecting syringe, and introducing the pipe into the cavity of the chest, I drew up the piston, and thus exhausted the air, till I found I was stopped from proceeding by the lung which had risen up and applied itself to the mouth of the syringe. The skin was then immediately brought down over the aperture in the thorax, and served like a valve,

to



to prevent the further ingress of air into that cavity. About ten ounces measure of air might probably have been extracted by the syringe. As this quantity of air could have occupied but a small space when compared with the size of the thorax, it was probable that the back part of that cavity was filled with fluids. — Nothing further, however, was done at this time ; and shortly after the poor woman fell asleep, and breathed with comparative ease for nearly six hours. But the difficulty of breathing again increased during the night, and at noon on the following day, was nearly as great as ever. Mr. Harvey and I agreed, however, that it would not be wrong to inspect the thorax, to see if the lung had collapsed, or if we could by any means afford relief to the patient. Upon separating the adhesion which had formed between the skin and subjacent parts, and introducing a finger through the aperture in the pleura, we found the lung adhering to the inside of that membrane ; but upon slightly varying the patient's posture, some turbid bloody serum flowed from beneath the lung. When we had discharged as much of this fluid as

we

We conveniently could, the external wound was closed; but the patient continued to breathe with increasing difficulty till about midnight, when she died.

### *Dissection.*

On examining the body, no air was discovered in the cavity of the chest. The right lung was partially inflated, and the anterior part of it closely adhering to the pleura costalis, as far as the place where the opening had been made. About three pints of bloody fluid lay in the hollow of the ribs posteriorly, and about half filled the cavity of the chest on that side; the surface of it being nearly on a level with the opening which had been made to exhaust the air. Upon the surface of this fluid, the half-inflated lung seemed to float. — I looked for the place where the lung had been wounded by the injury; but cannot say that I could perceive it. It was, however, certainly healed; for the lung bore inflation without letting the air escape from it. The pleura was covered with coagulated lymph. The cells of the lung contained a quantity of fluid, and the whole substance of it was  
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of a livid colour. — The cells of the lung of the opposite side of the chest also contained more than their ordinary quantity of fluid; its vessels were turgid, and it was hard and thickened in several places; which was probably owing to former disease. There was likewise more than a usual quantity of turbid serum in the left cavity of the thorax.

It seems to me highly probable, that there are two states of the lungs in emphysema, one of which, indeed, can rarely be proved by examination, since the patients in general do well. I have, however, met with instances in which patients affected with emphysema from a wounded lung, died of other injury, and thus been able to ascertain that the lung had not collapsed. I once also met with a proof of this fact in a patient who survived, and I will relate the circumstances of the case.

#### CASE.

Mr. Crowther requested me to see a poor man who was brought into a work-house with fractured ribs, accompanied with a



great degree of emphysema. The integuments covering the upper part of the left side of the thorax and neck, were elevated to a great degree by air that seemed confined in one cavity, and not diffused in the interstices of the cellular substance. The integuments of the face were also considerably inflated. The pulse was very frequent and small, and respiration quick and difficult. The extremities were cold. All these circumstances had taken place so rapidly, and were apparently increasing with so much celerity, that I thought it right, for reasons which will be mentioned afterwards, to make an opening into the cavity of the thorax which I accordingly did, between the 7th and 8th ribs, where the digitations of the serratus anticus muscle meet those of the external oblique. The external wound was made in the manner described in the foregoing case. The lung was in contact with the sides of the chest, nor did it recede when exposed. Should such an occurrence ever take place, a surgeon has the means of preventing its happening to any injurious degree, by instantly closing the wound. We next made  
a punc-

a puncture through the distended integuments on the front of the chest, about opposite to the collar-bone. A blast of air escaped, and they subsided to their original level. The diffused air was expressed in some degree from the integuments of the face and neck through the same wound. A bandage was now applied round the walls of the chest, so as to prevent their motion and the escape of air into the cellular substance, and the patient was afterwards bled. No more emphysema occurred, and the patient did as well as in a case where the ribs are merely broken, and the lungs uninjured. I cannot satisfactorily account for the great quickness and difficulty of respiration that took place in this case, except by attributing it to the agitation of the patient's mind, alarmed by the inflation of his neck and face.

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I have seen so many cases of emphysema, attended with very little difficulty of breathing, or other inconvenience, indeed, proceeding in a manner so like cases of fractured ribs

ribs unaccompanied with wounds of the lungs, that I cannot suppose patients were in these cases reduced to the necessity of breathing with one lung only. These patients indeed were all treated in the manner recommended and practised by Sir William Blizard. Observing the great pain and irritation which the constant motion of the fractured ribs occasioned, he was induced to disregard the emphysema, and to confine the motion of the ribs by a tight bandage, in the same manner as when the lungs are uninjured: afterwards the patients were largely bled, and other evacuations were freely made. This practice he has since continued with general success. The pressure of the bandage in general prevents the air from escaping out of the wounded lung, and pervading the cellular substance. It will, perhaps, appear probable to many surgeons, that, for this very reason, the air will be likely to insinuate itself between the two pleuræ, and thus occasion a collapse of the lung. I do not, however, see any good reason for such a supposition. The two pleuræ remain in their natural state of contact; and there is no



space for the air to pass between them. So frequently also are there adhesions between the surface of the lung and the sides of the thorax, that I think, in some of the cases of emphysema which I have seen, this circumstance must have occurred, and that if the lungs had receded from the sides of the thorax, the symptoms would have indicated the laceration or stretching of these adhesions.

An idea has generally prevailed among surgeons, that if the pleura costalis were divided in the living subject, the lung would immediately collapse, as it is usually found to do in the dead one. But M. Bremond\* has shewn by experiments, that not only when an opening is made into the cavity of the thorax, but even when some of the ribs are removed, the lungs still occupy their natural situation, and are even thrust up into the opening during expiration. Mr. Norris has also lately shewn, by experiments undertaken for this purpose, as well as by observations on the effects of accidents, that frequently the lungs do not collapse when

\* *Memoirs de l'Acad. des Sciences*, 1739.

the cavity of the chest is exposed in the living animal \* ; and I have also had occasion to observe, on dividing the pleura costalis in a case of supposed hydrothorax (in which, however, no water was found), that the exposed lung did not collapse; a circumstance which, I think, ought to encourage us to a more frequent performance of such an operation. In other experiments, however, the lungs have been known to collapse; and the circumstances, on which either of these effects depends, are not perhaps well understood.

For these reasons, I believe, that in most cases of emphysema succeeding to broken ribs, pressure by bandage not only hinders the air from diffusing itself through the cellular substance, but serves to prevent it from escaping out of the wounded lung, and of course facilitates the healing of the wound, which would be prevented by the constant transmission of air. Its early application, therefore, will often prevent a very troublesome symptom, whilst, at the same time,

\* Memoirs of the Medical Society of London, vol. iv. p. 440.

by keeping the fractured bones from motion, it greatly lessens the sufferings of the patient.

In some cases where the lungs are wounded by the ribs, the air does undoubtedly get into the cavity of the thorax, as happened in the case of the poor woman already mentioned, and as I have seen in other instances. When the air passes from the wounded lung into the cavity of the chest, and the lung becomes in consequence collapsed, still the symptoms and progress of the complaint will differ from the effect of circumstances which have not been much attended to. When the wound in the sides of the thorax allows of the expulsion of air from that cavity during expiration, and does not admit air during inspiration, it is not to be supposed that the wound of the lung can heal; for the cavity of the thorax must, under these circumstances, be filled from the wounded lung every time that it is enlarged during inspiration.

But this state of circumstances, which is so particularly injurious, and which usually takes place when the lung has collapsed in  
the



the manner described, it is the business of the surgeon to remedy : and it may be accomplished in two ways ; First, by preventing the escape of the air from the cavity of the chest, in which case the necessity of its being filled from the wounded lung will, in a great measure, be done away. And as I know surgeons have apprehended, that if an outlet was not given to air from the cavity of the chest, the opposite lung might become oppressed, I beg them to reflect a little on the state of respiration under these circumstances.

To examine this subject, let us suppose the thorax expanded, and one of its cavities filled with air, at which time the patient attempts to make an expiration ; what will be the effect ? The air cannot return through the wound in the lungs ; and we have supposed that it cannot escape through that in the pleura costalis. The muscles of respiration are unable then to produce any considerable change in the dimensions of the cavity, without an exertion productive of pain, which it is not probable that they will make ; the in-

active diaphragm will not be thrust up into the hypochondrium as in natural expiration, and the ribs will remain nearly stationary; but in proportion to the degree of the expiratory effort that is made, the air may be condensed, and the mediastinum thrust to the opposite side of the chest. But no injury will arise from this pressure, neither can it happen in any great degree; for both sides of the chest being diminished at the same time, a slight compression of the opposite lung cannot be detrimental, since it helps to express the air from it,—the very effect which is now required; and as that lung is pressed inwards by the sides of the thorax, it will counteract any great pressure made on the mediastinum. Upon inspiration taking place, the condensed air will expand and fill the enlarged cavity, and the mediastinum will regain its natural situation; so that the function of the sound lung is scarcely, if at all, impeded by the compression which takes place on the opposite side of the chest.

In whatever state the lungs happen to be when they are wounded, a bandage, if it can  
be

be borne, seems therefore to me extremely useful. By means of it, the pain and irritation, which the motion of the fractured ribs must otherwise occasion, are, in a great measure, or entirely, prevented. In that state of the lungs which I have first described, the pressure of a bandage prevents emphysema, and does no harm; in the other, it not only prevents emphysema, but does good, by keeping the collapsed lung at rest, and thereby free from the necessity of constantly transmitting air. Patients, however; will not always be able to wear a bandage when one lung is collapsed (particularly if any previous disease has existed in the other), as it equally confines the motion of the ribs on both sides, and as every possible enlargement of the chest becomes necessary for the due admission of air into the lung which still executes its functions. Under these circumstances, if the emphysema continues (and its continuance must always denote that the wound in the lung is not closed), I should esteem it the best practice to make a small opening into the chest, so that the external air might have free communication with that



cavity ; and then the injured lung must remain motionless till its wound is healed, and the mediastinum will, in every state of the thorax, preserve its natural situation.

As almost all the circulating blood must, in such cases, be transmitted through the vessels of one lung, if the quantity of that fluid be not greatly diminished, the pulmonary vessels will become turgid ; a larger effusion of fluids will therefore take place into the air-cells and cavity of the chest, and thus the function of the acting lung will be materially impaired. This reasoning illustrates what experience has already determined, viz. that the preservation of life in these cases depends on the most copious blood-letting.

The case, which I have related, clearly shews, that the collapsed state of the lung affords an opportunity for the wound of its surface to heal ; and when this desirable event is accomplished, the air which is at that time in the cavity of the thorax, will be speedily absorbed, and the lung will again  
acquire

acquire its former size and situation. But should the function of it be more immediately necessary, from a diseased state of that on the opposite side, or from other circumstances, it may be more quickly restored by exhausting the air, in the manner described. If the cavity of the chest contain a quantity of fluids, and it is thought right to extract them, it cannot well be done by varying the posture of the patient so as to let them run out of the opening that has been made: the difficulty with which respiration is performed, will render such an attempt almost insupportable to the patient. It would therefore be better to introduce a hollow bougie, or some such instrument, into the posterior part of the thorax, there connect it to the syringe, and thus extract the contained fluids. I need scarcely add, that the same method may be employed with advantage for the extraction of water from the cavity of the chest in hydrothorax.

The great advantage of retaining the lung in a collapsed state is, if possible, more strikingly shewn when those bodies have suffered  
a greater

a greater degree of injury than can occur to them from the fracture of a rib. I have seen cases in which bullets have passed through the lungs, near the root of those bodies, and where many of the large vessels were consequently torn, in which the blood has been poured into the cavity of the chest, has condensed the lung by its pressure, and thus suppressed the hæmorrhage. The injured vessels might, under these circumstances, unite; and the blood being let out of the thorax, the lung might gradually be restored to its former function. Yet in the cases which I was a witness to, the patients died of inflammation and fever; but the particular nature of the circumstances was unknown during the life of the patient; and of course the conduct appropriated to them was not pursued. The fluid contained in the cavity of the thorax had in these cases undergone a degree of putrefaction previous to the patient's death; which state required its discharge.

But should this be attempted in other cases, it becomes very essential to keep the  
thorax



thorax filled with air, lest the lungs should become prematurely inflated, the newly-healed part lacerated, the hæmorrhage renewed, or inflammation induced; and the surgeon would be able, I believe, without much contrivance, to regulate the inflation of the lungs, as circumstances seemed to indicate. Surgeons used formerly to keep canulæ in the thorax in these cases, with a design to give an outlet to fluids; but such means might have been beneficial by preserving the lungs collapsed; and they might have been continued from being found serviceable, though the manner in which they became so was unknown.



## SURGICAL OBSERVATIONS.

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### ON THE OPERATION OF PUNCTURING THE URINARY BLADDER.

**M**<sup>R.</sup> Home, to whom the profession is much indebted for many important improvements in practice, has of late published some cases of the puncture of the bladder from the rectum, which, in opinion, are of the greatest importance. They not only exhibit that operation as more simple and successful than perhaps was generally believed, but if the operation be as successful in the hands of other surgeons, it presents an easy mode of relief to a great number of unfortunate patients, who have generally been left to die in misery. I mean those who have strictures impassable by bougies, and who are so irritable that they cannot bear



the application of caustic, on account of the retention of urine which it occasions. In such cases the puncture from the rectum appears most eligible, because the bladder is contracted, is in general irritable, and will not perhaps ascend high enough to admit of being punctured above the pubes.

But there are cases in which the operation by the rectum cannot be performed, and by frequently meeting with these I have been compelled to puncture the bladder above the os pubis, and the event of the operation has been such as would have led me to prefer it to any other that I had seen practised. The chief cases to which I allude are those of enlarged prostates, where the catheter has been forced into the substance of the gland, and has torn it considerably; consequently that instrument enters so easily into the false passage as to render it almost impossible to make it take the right one. Indeed in cases of stricture, where false passages have been made, and the prostate has been found, the perception of the bladder from the rectum has been so indistinct that I have been de-

terred from puncturing it; and in one case I made a division in the perinæum, and having passed my finger beneath the arch of the os pubis a considerable way, I could obtain no such distinct perception of the bladder as would authorise me to push in a trochar. But I punctured it above the os pubis, and drew off a considerable quantity of urine. I have therefore been led to conclude, that in some distended bladders, there is a kind of recession of them from the perinæum, and that when they become distended they ascend proportionally higher into the abdomen.

In the greater number of cases in which I have punctured the bladder above the os pubis, it has been on a sudden call to the hospital, or some poor house; and I have had little further concern with the patient than what related to the performance of the operation.

Sometimes I have been in doubt if there was much urine in the bladder, and this circumstance has deterred me from puncturing,  
except

except in that situation in which I could possess an assurance that I felt the bladder, and could puncture that viscus: and these doubts caused me in some instances to puncture the bladder with a lancet; and in some cases I have not left any canula in the bladder, in consequence of the escape of the urine preventing me from readily finding the opening which I had made. Several of the patients died, but in every instance the operation relieved their sufferings; and I have never seen any effusion of urine into the cellular substance, or any other bad consequence result from the operation; nor do I think that such events are likely to happen, if it be rightly performed. The death of the patients was fairly to be imputed to the delay of the operation, or the degree of disease which previously existed in the urinary organs. In several patients who recovered, the progress of their amendment was similar to that which took place in the case, which I am about to relate. I did not, however, preserve any detailed account of them, for, as I have mentioned, the patients could scarcely be said to be under my care. I have  
requested



requested the last gentleman, with whom I attended a patient under these circumstances, to give me a particular account of his case, and on the accuracy of his narrative I can place perfect reliance. This case I shall relate, in order to have an opportunity of commenting on the mode of puncturing the bladder above the os pubis.

### C A S E.

A gentleman, between sixty and seventy years of age, had a retention of urine from an enlarged prostate gland, which obliged his surgeon to draw off the urine night and morning. This was done during ten days, when the difficulty of introducing the catheter, which had gradually increased, became insurmountable. I was therefore obliged to puncture the bladder, and the only place in which this operation could in the present instance be performed, was above the pubes. I therefore made an incision about two inches in length through the integuments, and between the muscoli pyramidales abdominis, so that the lower part of the wound laid bare the top of the symphysis pubis. On introducing

ducing my finger into this vacancy I felt the distended bladder. The sensation produced by pressing against the distended bladder is I think so peculiar, and so different from any thing else which could occur in this situation, that if an operator has once felt it, he will not hesitate in deciding that it is the bladder against which he presses. The thickness and tension of its coats, and its fluid contents are the chief circumstances from which this peculiar feel seems to arise. When I first began to perform this operation, I was deterred from using a trochar by a fear of being misled by my sensations. I cautiously punctured the bladder with a lancet, designing to introduce a catheter through the wound; but the urine gushed out so violently, and the bladder became contracted so suddenly, that I could not discover the wound which I had made; yet under these circumstances, the urine passed from the aperture in the bladder, through the external wound, and was not diffused into the cellular substance. Indeed neither observation nor reasoning would induce me to suppose that such an occurrence is probable, whilst there

is a free external opening. The apprehension seems to have arisen from the extensive diffusion of urine, in cases where the urethra has given way. But in such cases, the urine is actually injected into the cellular substance, and with great force, by the bladder, in consequence of the channel out of the body being closed up. If the external wound in this operation were to be closed, and the exit of urine prevented by this means, then it is probable that the urine would be forced to pervade the cellular substance. It may be asked, if urine is in any way likely, according to the common phrase, to insinuate itself into the surrounding cellular substance? I should think not. The operator should be cautious not to make any separation of the bladder from the back part of the symphysis pubis, that there should not be even a cavity into which the urine might gravitate. He should also leave the external wound free and open. The first effect of the operation will be an inflammation, which will consolidate the surrounding cellular substance, and prevent the ready impulsion of urine into it. The stimulating

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qualities



qualities of the urine will augment this inflammation, and thereby increase the effect. Indeed the stimulus of the urine often occasions a sloughing of the surface of the wound, which however makes no alteration in the general circumstances of the case. In later operations I acquired more confidence, and a belief that I could distinguish the bladder from any thing else by its feel; and one case which occurred tended further to embolden me in the performance of it. Being called on a sudden to relieve a patient, who had had his urethra lacerated, and being urged to puncture the bladder by several gentlemen who were present, and who were certain that a considerable quantity of urine was detained: though I could not feel the bladder distended above the pubes, I consented, as the patient was in imminent danger, to perform the operation, and having punctured the bladder with a trochar, four or five ounces only of urine were discharged. However a large quantity of urine gradually flowed through a canula which was introduced. The patient died, and was examined, when the cause of this occurrence

became apparent. A large cyst made by the protrusion of the internal coat of the bladder, had been formed between the bladder and the rectum, which contained the greatest quantity of the retained urine. The orifice, by which this cyst communicated with the bladder, did not exceed in dimensions the barrel of a common quill. It also appeared that, though the bladder itself could not in this case be said to have been distended, yet the front of it only was wounded by the trochar, and the back part was uninjured.

To return from this digression to the operation in the case which I was relating: after I had, by an incision between the pyramidales muscles, enabled myself to pass my finger along the upper part of the symphysis pubis, so as to press against the distended bladder, I introduced a common trochar of the middle size, in a direction obliquely downwards. There is an advantage, as Sabatier, in his *Medicine Operatoire*, observes, in introducing an instrument in this direction, for it accords with the axis of the bladder, and is therefore not likely to injure the op-

posite side of that organ. When I found that the instrument had penetrated the cavity, I withdrew the stilet within the canula, and then pushed the canula obliquely downwards, so that about two inches of it were introduced into the bladder. On withdrawing the stilet of the trochar, the urine gushed out with great force, but I prevented its escape, by placing the thumb of my left hand against the mouth of the canula, and then introduced through it in the same oblique direction, a middle sized hollow elastic catheter, till it met with resistance by touching the bottom of the bladder. After the urine was discharged, the canula of the trochar was withdrawn over the elastic catheter, which was left in its situation, and the end which came out of the wound was bent downwards towards the pubes, and attached, so as to be kept motionless, to a circular bandage put round the body of the patient. The wound, which was funnel-shaped, being wide externally, and gradually contracting to the bladder, was covered with linen, spread over with spermaceti salve. The urine flowed not only through the catheter,



catheter, but by the sides of it. A slight inflammation occurred round the wound, such as would doubtless tend to consolidate the surrounding cellular substance. The surface of the wound in this case did not even slough, at least in any evident degree. Four days after the operation the patient got up, and walked about his chamber, and feeling himself comfortable and well, he did not go to bed again till night. At the end of a week some few drops of urine came through the urethra, and the quantity thus discharged daily increased. At this time as the catheter seemed to be clogged up with mucus, it was withdrawn, and another was introduced with perfect facility. In about three weeks, as the urine came pretty freely through the urethra, the catheter was withdrawn, and the patient voided his urine by the natural channel. In six weeks the external wound was perfectly healed, and the patient was as well as before the retention of urine took place.

Since the publication of the preceding case, I have many times performed the same  
 o 4 operation,

operation, and without observing any thing contradictory to the statement which I have given. I shall briefly relate the particulars of one of the cases.

#### CASE.

A gentleman, who came from the country, was seized with retention of urine, and the medical man to whom he first applied for relief was unable to draw off that fluid. Before I made any attempt, I first introduced a bougie, which, I think, ought in all cases to be done, in order to examine the state of the parts prior to the introduction of more rigid and injurious instruments. It passed into the prostate, but could not be made to proceed further. A small sized catheter much curved, or bent upwards towards the point, was next introduced, which entering the bladder, the urine discharged. Upon attempting to withdraw the catheter, I found that I could not do it without employing considerable force, so firmly was it compressed by the neck of the bladder. I examined the prostate per anum, and did not find that gland materially enlarged, so that I conclude the  
difficulty

difficulty of introducing and withdrawing the instrument arose from an enlargement of what Mr. Hunter called the valvular part of the prostate, and Mr. Home describes as its third lobe. Being fully aware of the improbability of my being able to introduce a catheter night and morning to draw off the urine, in this case; I employed for that purpose, at my next visit, a flexible varnished catheter, and left it in the bladder. This gave pain to the patient, and did not long remain in the cavity of the bladder; I was therefore under the necessity of attempting to draw off the urine twice a day with the common catheter. I succeeded in doing this for several days, each time encountering a difficulty in introducing the instrument, which was surmounted by keeping the point of the instrument closely in contact with the upper part of the canal; and I continued to experience considerable difficulty in withdrawing the instrument after the escape of the urine. One morning, however, I was unable to accomplish the introduction of the catheter, and felt myself obliged to puncture the distended bladder. The operation was performed as  
in



in the preceding case. A month elapsed before the patient voided any urine by the natural channel. The quantity of that fluid which was discharged through the urethra when he wanted to make water was at first small, and gradually increased in another fortnight to about four ounces. After this evacuation, the plug being removed from the tube inserted at the pubes, six or eight ounces of urine were discharged from it; it therefore appeared, that the bladder had but very partially regained its power of expelling the urine. When this operation is performed, we can know with some degree of accuracy when the bladder has fully regained its powers; and, consequently, when we ought to remove the tube. The patient was very anxious to return into the country, and I knowing the great impediment that existed to the expulsion of the urine in his case, dared not to remove the tube; nor has it appeared proper to do it since that time. He has now kept the tube in his bladder, I believe, more than two years. He has lately complained much of the badness of the varnish with which the tubes are covered; and

and it is greatly to be regretted, that in this country, no one has the art, or takes the trouble, of varnishing these catheters as they are done in France.

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*On the Tic Douloureux.*

As the public attention has been of late excited to that painful affection of the nerves, called Tic Douloureux, I shall in the next place relate a case of that disease, which lately came under my care, because it seems to me to elucidate the nature of the disorder, to demonstrate the degree and kind of advantage which is likely to result from the division of the trunk of the nerve, and also to illustrate some circumstances in the anatomy and physiology of the nervous system, of which I have not as yet met with any satisfactory explanation.

CASE.

A lady became gradually affected with a painful state of the integuments under and adjoining

adjoining to the inner edge of the nail of the ring finger of the left hand. No injury to the part was remembered which could have brought on this disease. The pain occurred at irregular intervals, and was extremely severe during the time of its continuance, which was for a day or two, when it usually abated. Accidental slight injuries always occasioned great pain, and frequently brought on those paroxysms, which however occasionally occurred spontaneously, or without any evident exciting cause. In all these particulars the disease correctly resembled the Tic Douloureux of the nerves of the face. As the pain increased the disorder seemed to extend up the nerves of the arm. After the patient had endured this painful affection for seven years, she submitted to have the skin, which was the original seat of the disorder, burned with caustic. This application gave her intense pain, and on the healing of the wound she found her sufferings rather augmented than diminished by this experiment. After four more years of suffering she consulted me, when the circumstances of the case were such as to render an

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an operation indispensably necessary. The pain of the part was intolerable, and it extended all up the nerves of the arm; and this general pain was so constant during the night, as to deprive the patient of rest. The muscles of the back of the neck were occasionally affected with spasms. The integuments of the affected arm were much hotter than those of the opposite side, and sometimes the temperature was so increased as to cause a burning sensation in them. Under these circumstances, I did not hesitate to divide the nerve of the finger, from which all this disorder seemed to originate. I laid it bare by a longitudinal incision of about three quarters of an inch in length, from the second joint of the finger, and divided it opposite to that joint, by a curved sharp pointed bistoury which was conveyed under it. I then took hold of the nerve with a pair of forceps, and reflecting it downwards, I removed a portion of it half an inch in length, that the possibility of a quick re-union might be prevented. The wound was brought together by sticking plaster, and it united by adhesion: but the upper part of the wound, opposite

opposite to the upper end of the nerve, became slightly inflamed, and was very painful; however the appearance of inflammation gradually went off in the course of three weeks. After the operation I pinched the originally affected integuments sharply with my nails, without causing any sensation; but if in so doing I moved the finger, then pain was felt. I found it difficult to convince the patient that the skin at that part was actually devoid of sensation, for she still continued to feel similar sensations to those which formerly occurred, though in a much diminished degree: but she became gradually as perfectly convinced as any medical man could be, that these sensations arose from the irritated state of the end of the nerve, above the place where it was divided. The painful affection of the nerves of the arm still continued, though considerably lessened in violence; however, it was sufficiently severe to make the patient apprehend that little permanent benefit would arise from the operation. This pain continued occasionally about four months, with varying degrees of severity, but the temperature of the skin was not

hotter than that of the opposite side, as it had been before the operation. At the expiration of three months, the patient ascertained that the integuments at the end of the finger actually felt when any thing was applied to them, and this proved a new source of alarm. More than nine months have now elapsed since the performance of the operation, and the general pains in the nerves have become very trivial; but the sensation of the integuments at the end of the finger has during that time gradually increased, and the skin has now its natural sensibility, so as accurately to distinguish the tangible properties of any body applied to it. If also the originally affected part be compressed slightly, painful sensations resembling those which formerly occurred take place.

The observations of Dr. Darwin relative to ocular Spectra, and the experiments of Mr. Home on the contraction of divided nerves (contained in the Croonian Lecture, inserted in the Philosophical Transactions for the year 1801) have given a kind of demonstration that there is a subtile and mobile  
matter



matter superadded to the visible fabric of nerves, and sanction the use of the yet novel terms of the irritability and irritable actions of nerves, and I shall therefore employ them in the few subsequent remarks which I have to offer.

The case above related appeared to me to merit publication, because I believe it is not a common occurrence for the tic douloureux to happen any where but in the face. In the instances related by Mr. Home in his Croonian lecture, the disease was the effect of an injury done to the thumb; and it is reasonable to suppose that it would not have taken place without a predisposition to it in the constitution of the patients. It is also not unfair to conclude that the disease thus occasioned was of a more general nature, and less confined to the extreme branches of the nerves, and therefore less susceptible of cure by an operation. The case, which I have related shews, as indeed might have been concluded *à priori*, that though the source of the irritable state of the nerves in the tic douloureux may be cut off by an operation, yet that the  
general

general irritable actions of those organs, which had been excited, and had continued for a long time, would not immediately cease, though they might, as happened in this instance, gradually subside.

The speedy return of sensation, which is both accurate and acute in the present case, must surely be deemed a curious circumstance. It cannot be attributed to a reunion of the divided nerve, since so large a portion of it was removed; for I believe in simple divisions of the nerves by accident, sensation is slow in returning. It must, I think, be admitted, that sensation in the present instance took place through the medium of the communicating branches of those organs, and probably its speedy renovation was the effect of their unusually active or irritable state.

Nerves strikingly resemble arteries in their modes of communication; sometimes they conjoin even by considerable branches, such as must be manifest, in common dissections; but they communicate in surprizing numbers

by their minute ramifications. This circumstance is not perhaps so familiarly known to professional men, since it cannot be perceived unless in the course of a very minute dissection, and to understand how numerous these communications are, the representations given by the German authors, of their delicate and laborious dissections, may be advantageously consulted\*.

The communications of nerves seem also not to have excited much attention amongst physiologists; at least I have not met with any probable conjecture concerning their use. I shall therefore take the liberty of mentioning as briefly as possible, what has occurred to me on that subject.

The opinions of Mr. Hunter respecting a subtle matter inhering in the brain and nerves, and diffused throughout the body, are, I believe, generally admitted, though variously expressed. Now if the brain and

\* See Meckel's Representation of the Nerves of the Face, or Frotfcher's of the Cervical Nerves, in Ludwig's Opera Minora, or Walther's Plates.



nerves be supposed in those animals who possess them, to be the chief if not the sole organs for the preparation of this subtle matter, then it appears as necessary that the nerves should communicate, as that the arteries should do so. For if the continuity of the trunk of either of these organs were destroyed, the parts, which its branches supply, would perish were it not for their communication with the minute branches of other adjacent trunks. It is probable that one of the advantages derived from important organs being supplied from plexuses of nerves is, as has been suggested by Soemmerring, that such essential organs should never want that animation and influence, which they derive from the nerves, even should casual obstruction take place in some of the trunks leading to such a plexus. But parts less essential to life, equally require that such interruption of the nervous energy should be guarded against. Have we not a plexus formed in the axilla, prior to the distribution of nerves, to the upper extremities? do not the sacral nerves form a plexus, in order to form the ischiadic or posterior crural nerve?

and may not the same circumstance be affirmed with respect to the anterior crural, and obturator nerves, since they arise from the complicated union of the lumbar nerves, with a branch of the first sacral nerve? The reticular communications of the minute nerves may not only serve the purpose which has been suggested, but, as appears from the present case, the actions which take place in the extremities of the nerves may, by them, be propagated to the sensorium, and thus produce sensation. Whether, in the present instance, the original painful actions of the extremities of the nerves may again recur, and be continued throughout the communicating branches to the sensorium, the future progress of the case will determine.

The Lady, whose case I have related, died about four years after the operation, of disorder of the digestive organs, to which she was habitually subject. Indeed, from what I have since seen of cases of Tic Douloureux, I am induced to believe, that this disorder is as much constitutional as either Gout or Rheumatism. I have known patients afflicted  
with

with it get well, either spontaneously, or in consequence of the administration of medicines which were likely to relieve or counteract nervous irritability.

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*On the Removal of loose Substances from the  
Knee Joint.*

I shall next relate a case in which some of those loose substances that are frequently found in the knee-joint were removed by an operation; because I think the case contains many interesting particulars, and because it will afford me an opportunity of offering a few observations on the necessity and mode of performing such an operation. Mr. Hey has of late recommended a bandage to keep these bodies stationary, and has related several instances of its efficacy, and of course of its preventing the necessity of undertaking a serious and uncertain operation. When loose substances exist in the knee-joint, and are lodged on either side of the patella, they produce but little inconvenience; but when



they slip under the ligament of the patella, and become interposed between the condyles of the os femoris and the tibia, they impede progression, and cause pain, and so much injury as to bring on inflammation in the joint. If the extensor tendons, the patella and its ligament, can, by Mr. Hey's bandage, be kept steadily pressed against the corresponding parts of the joint, then these bodies must remain stationary on one or other side of the patella, and the patient will be exempted from the inconvenience and injury which their motion in the joint occasions. Under these circumstances the necessity for an operation is obviated; but in the case which I am about to relate the bandage was of no avail, for reasons which will appear in the relation. It is not improbable also that though these bodies may occasion much irritation at first, yet that the joint becoming accustomed to their stimulus may afterwards be less affected by their presence, which circumstance ought to be adverted to and ascertained before an operation be undertaken.

## CASE.

A man, about forty years of age, having fallen from a ladder, and injured his knee, suffered afterwards a good deal from inflammation in the joint. The joint became much better, but never perfectly recovered; and after a year had elapsed he slipped in walking, and again injured his knee. From this time he became sensible of the presence of two moveable bodies in the joint, which incommoded him considerably. They frequently, in walking, got between the condyles of the os femoris, and the crucial ligaments, giving him great pain at the time, and produced heat and inflammation of the knee afterwards. He bore this inconvenience for several years, till at length, coming to London, he resolved to submit to the operation for their removal if it were recommended. When I saw him there was a considerable quantity of synovia in the joint, the knee was hotter than that of the opposite limb, and in this state he said it usually was. There was no difficulty in bringing the two loose substances to the

inner side of the joint ; and it required only to put that part in a depending position, and those bodies descended by their gravity through the fluid, and were easily fixed in the situation to which they had fallen. I could bring them on the inner surface of the internal condyle of the os femoris, which is of considerable extent, and by placing the points of my finger so as to describe a portion of a circle, I could prevent them from passing again into the cavity of the joint although the limb might be moved, and the patient press firmly against them with his finger, as if he meant to push them into the joint. Yet when my fingers, which thus confined them were removed, the slightest touch caused them to disappear, and to glide with velocity into the general cavity of the joint.

This is the situation, and the manner in which I think these bodies can be most conveniently and certainly fixed. The inner surface of the internal condyle of the os femoris presents an extensive and nearly plain surface, which terminates in front and at its  
upper



upper part by an edge which forms a portion of a circle. If the points of the finger be firmly pressed upon this edge so as to form a kind of line of circumvallation round these bodies, they cannot pass into the joint in this direction, nor can they recede in any other, on account of the tense state of the internal lateral ligament. Here these substances are near the surface, and may be distinctly felt; and there is nothing to be divided in order to expose them, but the integuments, fascia, and the capsule of the joint. Mr. Cruikshank says, that Mr. Hunter preferred removing these loose bodies at the upper part of the joint, as there, the bag which contains the synovia has less of the nature of a capsule. Mr. Ford, in a case which required the operation (and which is related in the Medical Observations and Inquiries), extracted the substance on the outer edge of the patella; and if the substance is large, it may undoubtedly be extracted in this situation. In the case, which I am going to relate, it would have been impossible to fix the loose substances in any other situation than that which I have described, and in my  
opinion

opinion that situation must in most cases be preferable to any other, for the reasons which I have mentioned.

I did not hesitate to undertake the removal of the bodies in the present case, as they could be so securely fixed. For the patient had tried bandages without any advantage, which perhaps was owing to the quantity of fluid in the joint preventing them from acting in the manner mentioned above. His sufferings were very considerable, and the necessary restriction in exercise extremely inconvenient. I thought it right to reduce the inflammation of the joint as much as possible, prior to the operation, and with this view directed the application of leeches, and of linen kept constantly damp with Goulard's wash: some aperient medicine was also given. By these means, in the course of three days, all the fluid was removed from the joint, and it was as cool, and free from pain and inflammation as the other knee; but when I endeavoured to get these bodies into the situations in which I had formerly fixed them, I found all my efforts were in vain.

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There was no fluid for them to descend through, and though one of them could be got into the situation which we wished, we could not, after trying nearly an hour and an half, succeed in getting both of them upon the condyle of the os femoris. I was therefore obliged to let the patient walk about a little, that some more fluid might be effused into the joint, and then I could bring them both into the same situation, and fix them as readily as before.

The operation was done in the following manner. Sir Charles Blicke, who assisted me, pressed the integuments of the knee gently towards the internal condyle, and then applied his finger in the manner I have described, round the circular edge of the bone. I also drew the integuments gently towards the inner ham-string, and divided them longitudinally, immediately over the loose substance, to the extent of an inch and an half. This withdrawing of the integuments from their natural situation was designed to prevent a direct correspondence in the situation of the external wound, and that  
of



of the capsule of the joint ; for when the integuments were suffered to regain their natural position, the wound in them was nearer to the patella, than the wound which was made in the capsule. The fascia which covers the joint being exposed by the division of the integuments, it was divided in a similar direction, and nearly to the same extent. The capsule was now laid bare, and I gently divided it to the extent of half an inch, where it covered one of the hard substances, which suddenly slipped through the opening, and by pressing gently upon the other, it also came through at the same part. The bodies, which were thus removed, were about three quarters of an inch in length, and half an inch in breadth. They had a highly polished surface, and were hard like cartilage. The fluid contained in the joint was pressed towards the wound, and about two ounces of synovia were discharged. I then drew the wound of the integument gently towards the patella, pressed the two sides together, and closed it accurately with sticking plaster, enjoining the patient to keep the limb as free from motion as possible.

No

No inflammation took place in the knee, either on that day, or the following ; but on the second night after the operation the patient suffered a good deal of pain, and in the morning the joint felt hot, and was distended with fluid as it had been before the operation. I now removed the dressings, and found the wound was closed ; but I felt very apprehensive lest, the inflammation of the joint continuing, the collection of fluid should also increase, and by distending the capsule, cause the wound to open. Having already seen in this case the beneficial effects of evaporating washes, which by diminishing the heat of a part check its tendency to inflammation, I was desirous of re-applying them. In order to prevent these applications from loosening the sticking-plaster, and causing the exposure of the wound, I made use of an expedient, which I have frequently employed, and which from its utility I think deserves to be mentioned. After having supported the sides of the wound in their situation by adhesive plasters as at first, I put over them a piece of linen which extended beyond them in every direction. This linen was made to

adhere to the surrounding skin, by smearing over the edge with a solution of sealing-wax in alcohol, and afterwards varnishing the linen over with the same solution. The alcohol having evaporated, and the sealing-wax remaining, no liquid could penetrate and detach the sticking-plaster. This is the same varnish with which some parts of electrical machines are coated, and its power of remaining unaffected by moisture and moderate warmth is well known.

Folded linen kept damp with laudanum and water was now applied, in the proportion of an ounce of the former to a quart of the latter. This wash I prefer, for the purpose above mentioned, to Goulard's wash ; for the precipitated powder contained in the latter is apt to fill the interstices of the linen, and prevent its imbibing the wash, so that the requisite evaporation does not go on. These applications quickly diminished the heat of the knee, and the quantity of fluid contained in the joint speedily decreased. The wound was daily dressed, and in a week was firmly healed ; and in a fortnight the

7 patient



patient might be said to be well. He has since the operation walked as much as he was accustomed to do, and has not found the least inconvenience.

I have since the publication of the preceding case, seen one of the same kind, so curious on account of the number of loose bodies contained in the capsule of the knee-joint, that it seems to deserve being mentioned. I do not exaggerate, when I say, they must much exceed a hundred in number, and feel like shot of various sizes, distending the capsule on either side of the patella. There is no fluid in the joint, nor do they prevent the patient from taking ordinary exercise.

*On the Treatment of one Species of the  
Nævi Materni.*

I shall relate two cases, and say a few words on the treatment of this complaint, which is a congenital deformity, consisting of a cluster of enlarged vessels, filled, and occasionally distended by the influx of blood from numerous surrounding arteries. The deformity to which I allude is so well known, and so frequent an occurrence, as to preclude the necessity of any description. Mr. John Bell has of late proposed an ingenious theory of its formation, and has denominated it an aneurysmal enlargement of the vessels, in consequence of their anastomoses. There can be no doubt that the repletion, distention, and consequent enlargement of the dilated vessels depends upon a kind of inflammatory action of the surrounding arteries; for, if that be wanting, the mark ceases to enlarge, and if present, it increases in size in proportion to the degree of inflammatory action. In many cases these marks having increased to a certain degree, cease  
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to enlarge; they then remain stationary, or gradually diminish, till they almost disappear. This occurrence is not so frequent as to induce surgeons to expect such an event, or to prohibit, in consequence of such expectation, their removal. For, if they continue to enlarge, the operation must be commensurate to their size. The consequences of their bursting are alarming and vexatious. It is not, however, my intention to speak of these affections in general, but only to state what, perhaps, may in some instances be done with success, when the removal of the unnatural structure cannot be accomplished. For this preternatural enlargement of vessels is not always cutaneous. I have seen it occupying the whole substance of the cheek, neither appearing beneath the skin nor the membrane of the mouth: I have met with it in the orbit of the eye, and have found it covering the whole of an extremity, or nearly one half of the trunk of the body. If any means can be pursued, under such circumstances, to check the progress of the complaint, they surely deserve attention. I was lately so fortunate as to succeed in



such endeavours, in cases, the relation of which is my chief object at present.

#### CASE.

A child about two months old was brought to St. Bartholomew's hospital, with this unnatural enlargement of vessels, distributed every where beneath the fore-arm, from the wrist to the elbow. In a short time it had swollen to that degree, that the circumference of the affected fore-arm was twice the size of the other. The vessels were large and contorted; and to give the reader an idea of their appearance, I may mention that the child's mother affirmed that they resembled the entrails of a pig, with which she had either been frightened or disgusted during her pregnancy. The skin was of a dusky hue, and had not its natural smoothness of surface. The heat of this fore arm was much greater than that of the corresponding sound one. Pressure forced the blood out of the vessels, and for the time diminished the bulk of the limb, and made it of a paler colour. The child's mother lives at Turnham Green, where Mr. Graham, an ingenious surgeon, who  
was

was for a long time a student at St. Bartholomew's Hospital, also resides. I requested this gentleman to take charge of the case, and try the effect of the following plan of treatment, which it seemed to me right to institute. First, I was desirous of ascertaining whether a permanent and equal pressure would not prevent the distension and consequent enlargement of the turgid vessels; secondly, whether reducing the temperature of the limb would not diminish the inflammatory action, upon which their repletion seemed to depend. These two intentions admitted of being readily accomplished. A many-tailed bandage of sticking plaster seemed adequate to effect the first, and wetting the limb with water the latter. These measures were judiciously carried into effect by Mr. Graham; the pressure was first made slightly, and afterwards more forcibly, as the part seemed to bear it without inconvenience. A roller was applied over the plaster, and kept wet, if the limb felt hotter than natural, so as to regulate its temperature. The success of these measures exceeded our most sanguine expectations. The size of the limb

gradually diminished, and its temperature became natural. After six months, Mr. Graham removed the bandages, which it was not necessary to continue any longer. The limb was in some degree wasted, from pressure and disuse, but it soon gradually re-acquired its natural size. After the bandages had been left off for a month, I saw the child. The skin was pale, and had a slightly shrivelled appearance. The contorted vessels felt like solid chords interposed between it and the fascia of the fore-arm.

#### CASE.

A child had this unnatural state of the vessels in the orbit of the eye. They gradually increased in magnitude, and extended themselves into the upper eye-lid, so as to keep it permanently closed. The clustered vessels also projected out of the orbit, at the upper part, and made the integuments protrude, forming a tumour as large as a walnut. Of course, the removal of this disease did not appear practicable. I was consulted on this case by Mr. Hurlock, to whom I related the success of the former experiment.

Pressure



Pressure to any extent was here evidently impossible: but the abstraction of heat, and consequent diminution of inflammatory action might be attempted. I recommended that folded linen, wet with rose water, saturated with alum, should be bound on to the projected part, and kept constantly damp. Under this treatment the disorder as regularly receded as it had before increased. After about three months it had gradually sunk within the orbit, and the child could open its eye. Shortly afterwards all medical treatment was discontinued, and no appearance of this unnatural structure remains.

A third case of a very extensive mark of this description, covering the back and shoulder, got well, as I am informed, by the same treatment. I have not, however, been able to learn the particulars. It appears to me probable, from the foregoing cases, that if the preternatural distention of the vessels could be prevented, the blood would coagulate in them; and thus this unnatural con-

texture of vessels, being rendered impervious, might become obliterated.

Since the publication of these cases, which is more than four years ago, I have seen many instances of such affections, and they have ceased to grow, and afterwards shrunk, and been no longer objects of any consequence when treated in the manner that I have described. I have only in one case been called upon to perform an operation for the removal of the swelling, which had attained a very considerable magnitude before I was consulted respecting its treatment.

*On Hæmorrhoidal Diseases.*

Mr. Hey of Leeds, in his highly valuable Observations, describes his mode of treatment of the procidentia ani, and that chapter of his work appears to me to deserve particular praise, because I have not found the same treatment recommended by other writers; and because, from the accounts of the patients themselves, it has relieved them from very great inconvenience and suffering. Wishing to corroborate the statement there given, and to add my mite of observation on the practice that is best adapted for the relief of such diseases, I may mention, in the first place, that my attention to this subject was particularly excited, even during my apprenticeship to surgery, from witnessing the sufferings of those who underwent what I may call the natural cure of piles. When these organised bodies are large and numerous, they impede the expulsion of the fæces, and the straining consequent to this impediment everts the bowel. When, at

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length,



length the patient is unable to restore the parts to their natural situation, the piles mortify and drop off, and then the bowel retires, leaving the patient considerably relieved from the difficulty and pain attendant on the expulsion of the fæces. The editor of Mr. Pott's work says, that Mr. Pott was remarkably successful in removing hæmorrhoidal excrescences, by ligature\* ; in some cases such means may doubtless be proper ; yet it has appeared to me, that tying hæmorrhoidal excrescences is productive of all that temporary distress which is observable in what I have termed their natural cure ; and as there is a general disorder in the functions of the alimentary canal in all such cases, the irritation occasioned by the ligature aggravates this habitual disorder, and produces sometimes very alarming symptoms.

With these facts before me, I was led to examine the structure of those piles which had been removed by a ligature, or which I

\* See Sir James Earl's edition of Mr. Pott's Works vol. iii.

accidentally

accidentally met with in the dead subject; and I found them to be merely fleshy substances, possessing no vessels of considerable size, nor such as should deter us from cutting the excrescences away. It is now twenty years since I first began to remove them freely with the knife or scissars, and I have never met with any circumstance to deter me, whilst the relief of suffering, which the operation has afforded to some, and the scarcely to be expected, and complete cure which it has effected in many, has been highly gratifying. Piles have been supposed to be owing to a dilatation of the hæmorrhoidal veins, and that these veins are sometimes enlarged, is evident from anatomical examination, and from cases which occasionally occur in practice. In a recent attack of an hæmorrhoidal affection, something occasionally protrudes from the anus, which when punctured emits a continued stream of blood, as a vein does when opened. When the blood ceases to flow the protruding part should be replaced, and maintained in its natural situation.

The origin and formation of internal piles, is, I think, similar to those which are external. When from irritation about the rectum, an external pile forms, a swelling suddenly occurs beneath the thin skin, near the verge of the anus, and the part is heated and painful. If the skin be divided, the swelling is found to be caused by effused blood; and if the clot be removed, there is no stream of blood emitted as from a vein. If the wound be small, blood again collects beneath the skin, and the swelling is reproduced. If the bowels be regulated, so that the state of irritation, which is the cause of these productions, be mitigated or removed, and if the slightly painful and heated swelling be cooled by evaporating washes, the effused blood is frequently absorbed, and the distended skin appears loose and pendulous. On the contrary, if the irritation continues from there being some permanent disease on the inside of the bowel, then the effused blood becomes an organized substance, and a permanent external pile is formed. The orifice of the anus is often surrounded by tumours of this kind, which, however, do  
not



not require to be removed, and are only indicative of internal irritation. In like manner blood is effused beneath the bowel just above the sphincter, and forms an internal pile. If it be divided, coagulated blood may be removed from beneath it, with the same events as occur in external piles. The effused blood is sometimes absorbed, and the pile disappears; but, more generally, it becomes an organized substance, and increasing in bulk, whilst others also form, they are productive of those inconveniences that have been represented.

Though the everſion of the bowel may, in many caſes, be attributed to the efforts made to overcome the mechanical reſiſtance, which theſe tumours oppoſe to the expulſion of the fæces; yet the everſion is not, in general, to be ſolely attributed to this cauſe. It ariſes alſo from an irritable and ſtriving action of the bowel, which produces a kind of intuſſuſception. Thus plaits of the bowel often deſcend in an irritable action of the part during the expulſion of the fæces. I have known many caſes of the following deſcription. A perſon having ſome diſorder  
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of the bowels, and having an urgent call to void the fæces, has suffered afterwards great pain for a number of hours. The next evacuation has been attended with similar consequences, and thus the patients have continued for a considerable time, ignorant of the cause of their sufferings. On introducing the finger, I have distinctly felt, and fairly replaced a fold of the bowel, and the patient has been immediately relieved from all uneasiness; and by repeating the same act, when required, and keeping the bowels regular by a mixture of castor oil and mucilage, with cinnamon water, they have suffered no uneasiness subsequent to the alvine discharges, and in a short time this faulty action of the bowel has entirely ceased. But if a patient remains ignorant of the cause of his sufferings, and does not adopt this mode of relieving them, the fold of the bowel becomes irritated and thickened by the pressure of the sphincter muscle; it enlarges and becomes in form adapted to this unnatural situation, and thus we often meet with folds of the bowel forming hæmorrhoidal tumours. When a pile, or any hæmorrhoidal

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dal tumour becomes inflamed and swollen, it has a tendency to draw down more of the bowel, and increase the disease.

The everſion of the bowel thus produced from hæmorrhoidal affections, muſt be conſidered as a different caſe from that proceſſus or prolapſus ani, which takes place independently of ſuch affections, and it is to the treatment of the former only that this paper relates.

In the firſt volume of theſe obſervations, I have mentioned, that to me, all kinds of irritation inducing local diſeaſes in the lower parts of the bowel, appear to be the effects of a general diſorder in the functions of the alimentary canal; and that the correction of the general affection is eſſential to the cure of the local diſeaſe. If the bowels can be got to regularly carry down and diſcharge the reſidue of the food once in twenty-four hours, the ſtraining from coſtiveness, and that irritable and repeated action attendant on purging, both of which muſt be injurious to the local diſeaſe, will ceaſe to aggravate it. The patient



patient should bathe and anoint the protruded parts with ointment, and carefully replace them above the gripe of the sphincter. Under these circumstances hæmorrhoidal tumours, and the procidentia ani often become of so little inconvenience, as not to induce a patient to wish for a more radical relief.

But, if from the magnitude or number of these hæmorrhoidal tumours, such an opposition should be created to the expulsion of the fæces, that the bowel is forced down at every attempt to discharge them ; if from the inflamed and ulcerated state of hæmorrhoidal tumours, they keep up an irritable action of the parts tending to maintain and aggravate the disease, then an operation seems to be required.

I shall now describe, in the briefest manner possible, the treatment and mode of operating which I have found most successful in these diseases. First, it seems essential, prior to undertaking any operation, to get the bowels into the habit of regularly evacuating the refuse matter of the food daily, and the liver

regularly secreting a due proportion of healthy bile. 2dly, The bowels ought to be perfectly cleared before the operation; and this may be accomplished, by giving to the patient such a dose of medicine as has been found, by experience, to be likely to answer this purpose without inducing a continuance of irritation and purging. The bowel being everted to the utmost by the efforts used in evacuating the fæces, and the parts cleansed by bathing with tepid water, the piles should be taken hold of by a double hook, of a breadth corresponding to the length of the pile, and when drawn upwards from the bowel, it may be removed by a pair of scissars. A protruded and thickened plait of the bowel may be seized in the same way; but I think it is better to use the bistoury in removing it, because the depth to which the scissars may cut is uncertain. The incision made by the knife resembles two curved lines joined at each extremity. The length of the incision should, both for the removal of piles and that of plaits in the bowel, be longitudinal, in the direction of the bowel.

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If, therefore, there be a transverse fold of the bowel of considerable extent, I think it best to take away two elliptical portions in the long axis of the rectum, rather than attempt more completely to remove it by a wound made in another direction.

The hæmorrhoidal tumours being removed, the wounds should be suffered to bleed as long as they are disposed to do so, and afterwards the parts should be completely replaced by means of the finger, previously anointed. As irritation is a principal cause of hæmorrhage from the small vessels, and as that is likely to be occasioned by any part of the bowel being lodged within the gripe of the sphincter, and compressed by that muscle, this part of the operation should be particularly attended to. The patient should now be speedily placed in an horizontal position, the nates should be exposed, and the parts surrounding the anus should be frequently bathed with cold water, to check inflammation and consequent hæmorrhage.

Frequently



Frequently from the apprehension of the vexation and trouble of a subsequent hæmorrhage, the surgeon is desirous, after an operation, of tying every vessel that could possibly pour forth blood; yet after the patient is put to bed, and becomes warm, particularly if there be any circumstance causing local irritation in the wounded parts, hæmorrhage even to a considerable degree ensues. The wound is opened and bathed, and often no vessel is discovered bleeding, or requiring a ligature. Diminishing the temperature of parts is one of the most potent means which we possess of lessening inflammatory action, and this seems to be best accomplished by the continual evaporation which is going on when parts are frequently wetted. Formerly I met with much trouble from hæmorrhage, particularly on account of the blood effused into the rectum, creating an uncontrollable propensity to discharge it per anum; and in this act the wounded parts became again protruded and injured. Since, however, I adopted the mode of treatment which I have described, I have witnessed no inconvenience of this kind. In general, the patients feel

very comfortable, and the anus seems as if there were no disease. When the parts have been for some time tranquil, and the risk of hæmorrhage has ceased, the parts need no longer to be bathed or exposed.

The patient should be restricted in his diet : the food should be of the most nutritive quality, and such as is likely to leave the least residue, but the quantity should be as small as possible, because it is an object to keep the restored parts undisturbed for as long a time as possible. If the opening medicine, which has been given with a view to clear the bowels, before the operation, should be likely to affect them afterwards, some opium may be administered to prevent it.

Under these circumstances, I have known patients lie for eight or ten days undisturbed, and during that time the wounds, it is probable, had nearly, if not entirely, healed, as the subsequent discharges from the bowels were effected without hæmorrhage, or the descent of any part. However, as these patients have a disordered state of the digestive organs,

organs, sensations seemingly requiring some alvine discharges for their relief, will induce us to give some opening medicine long before that period. Experience in the case of our patient should have previously taught us, by what dose of medicine we might calculate, with some degree of certainty, to procure one sufficient and lax motion, which should be parted with by the patient with as little effort as possible. It is better that the patient should not attempt to evacuate the contents of his bowels till his sensations become urgent. When a sufficient discharge has taken place, if any thing has descended, it ought to be carefully replaced as it was after the operation. A small dose of laudanum may be given to stop any further effect from the purgative medicine. Now, though such operations, conducted on the plan which I have described, have been productive of the beneficial effects which I have represented in the beginning, it is wrong to promise too much to patients in general, because the irritable and disordered state of the digestive organs, which is habitual, and which has produced the disease may keep up a disor-



dered state of rectum afterwards, and occasion new diseases to form of the same nature.

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*On Fistulæ in the Perinæum.*

Towards the conclusion of the second part or volume of these observations, when speaking of the effects of diseases of the urethra, I had designed to insert a chapter explanatory of some circumstances relative to those abscesses and diseases, which frequently take place, and lay the foundation for fistulæ in perinæo. In consequence of my being much hurried by business at that time, it was omitted, yet thinking that its publication may be useful, I insert it at the conclusion of the present volume.

It is well known, that abscesses form in the vicinity of the urethra, when it is in an irritable state, but there are some circumstances relative to their progress, which perhaps have not been generally or sufficiently attended

attended to. When matter forms in the course of the membranous part of the urethra, or in the neighbourhood of the bulb, it does not produce inflammation of the skin, or break like a common abscess; on the contrary, the skin is but little affected, and as the matter increases in quantity, it appears kept down as if it were collected beneath a fascia. Under these circumstances it in general comes forwards, in the course of the spongy substance of the urethra, and bulges out in the middle of the scrotum, forming there a tense protuberant swelling. I have sometimes known the matter make its way backwards, and present itself between the thigh and buttock, a little below the rectum. These circumstances indicate, that there is a fascia spread beneath the skin of the perinæum, over the subjacent parts; yet, I think, the limits of this fascia can scarcely be ascertained by dissection.

The knowledge of its existence appears to me of importance in explaining many occurrences which take place about these parts, though its density and strength varying

in different persons, the facts which I am endeavouring to represent will vary in degree in different cases.

The abscesses of which I am speaking are often simple, no urine having escaped from the urethra to give rise to them, though sometimes after they have been opened, urine is found to pass through the cavity of the abscess in a greater or less degree.

These abscesses ought of course to be treated as collections of matter beneath fasciæ in general; they should be opened at an early period, to prevent their enlargement. A free opening is proper, because the skin being only slightly diseased, and having a great propensity to heal, will sometimes prevent the free escape of any matter or urine, which may be in the cavity of the abscess. The cavity will then become distended and enlarged, perhaps in a direction between the rectum and the thigh, requiring another opening to be made in that situation: yet, in general, I have not found it necessary to divide the skin throughout the whole front of the abscess.

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The complicated sinuses, which form in some cases of fistulæ in perinæo, do not appear to me to arise from such simple cases, but from the urethra ulcerating in many parts. Anatomical examination has shewn this to be fact in several cases which I have inspected.

The ulceration, or giving way of the urethra, is, I think, generally understood to be the consequence of a stricture affording so complete an obstacle to the passage of the urine, as to occasion the canal to inflame, ulcerate, or slough above the impediment. It is very evident that this is not unfrequently the case, yet I do not believe that surgeons in general, are sufficiently impressed with the knowledge of the following fact, that the urethra may ulcerate in various parts from irritation, even whilst there is a sufficient channel for the free exit of the urine. The following cases are related in proof of this fact:

#### CASE.

A gentleman had been attended for a typhoid fever for between a fortnight and three

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weeks,

weeks. A clyster was ordered for him; but the person who was desired to administer it, could not readily introduce the pipe; and, on examination, it was discovered that there was a considerable induration, discolouration, and swelling of one buttock, by the side of the anus. On this account I was desired to see the patient, and the appearance of the part instantly induced me to say, that some urine had escaped from its natural channel, and caused the inflammation which had been productive of these peculiar appearances. The powers of the patient's mind were weak and wandering; yet, when I asked him in a loud voice, whether he had any difficulty in voiding his urine? he replied, Oh, I told you, it was my first grievance. Yet I saw him void his urine freely, and in a moderate-sized stream. Perceiving that there was fluid beneath the thickened and discoloured integuments, I divided them, and discharged a considerable quantity of putrid matter, urine, and sloughs. The patient became, for a time, much better, and urine passed freely through the wound; yet he afterwards gradually sunk, and died. In this  
case

case, the urine must have escaped from its natural channel very high up, and have been forced into the cellular substance connecting the bladder and the rectum, producing that peculiar inflammation, which probably occasioned the typhoid fever.

#### CASE.

A similar occurrence happened to a patient whom I had previously attended on account of strictures in his urethra, and which had been so far relieved, that a moderate-sized bougie could be passed into the bladder, and he voided his urine freely in a moderate-sized stream. He had for some months discontinued the use of bougies previously to the event which I am going to relate. He was seized with a kind of low fever, but his attention seemed to be directed to the seat of his disease, so that it became remarked at an early period, that the integuments of the buttock, by the side of the rectum were inflamed. The similarity of this case to the preceding one induced me to make an incision through the skin and subjacent substance to some depth, when a considerable quantity of foetid matter and urine gushed



out. I saw this patient void his urine, which he did with apparent freedom, and in such a stream as I have described. He was relieved by having an outlet given to the urine and matter, which continued to pass freely through the wound; yet he afterwards gradually sunk, and died. To my great regret, I was prevented from examining the parts after death, in both of these cases.

#### CASE.

A patient who had suffered for more than a fortnight with slow fever, in which his intellects were so impaired, that he communicated no information to his medical attendant respecting the nature of his disorder, was observed to have a swelling near his left groin, which was supposed to be a common abscess. This disease increasing, and shewing no tendency to break, after a few days, I was desired to see the patient. The swelling then was as large as an orange, but oblong, extending from the groin down the front of the scrotum. The colour and induration of the skin, in such cases, are in general so peculiar, as at once to impress the opinion, that effused urine has been the cause of the inflammation.

inflammation and abscess. I without hesitation cut through the thickened integuments, and discharged about six ounces of putrid pus and urine. A quantity of sloughy cellular substance soon afterwards protruded through the wound, which gradually separated and came away. The patient's intellects soon became clear, all fever left him, and he soon regained his usual state of health. In this case, I conclude, that the urethra had given way on its left side, in front of the fascia, which covers and binds down the parts beneath the skin of the perinæum, and in the vicinity of the abscess. I mention this opinion to lead us to form a probable conjecture as to the cause of the urine becoming diffused, in some cases, beneath the integuments of the pubes and abdomen.

When circumscribed abscesses form, it is probable, that the quantity of urine which escapes from the urethra is small, and that by its irritation it occasions adhesion of the surrounding cellular substance. In the case just related, the quantity must have been sufficient to have occasioned the death of a considerable quantity of cellular substance.

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When the urine is diffused, and injected into the cellular substance extensively, scarifications afford but an ineffectual outlet to it. The practice most appropriate to these cases would be, at as early a period as possible, to make a wound down to the aperture in the urethra, so that whatever urine may escape from the canal should run freely out of the wound, and be no longer forced to pervade the cellular substance. Yet it is difficult, nay, perhaps in some cases impossible, to know where the urethra has given way; and one object which I had in view in relating these cases, was to induce others to reflect, and to endeavour to ascertain, by experience, how and where we ought in different cases, to make such wounds as will afford free discharge to the urine, and prevent the horrible effects of its becoming extensively diffused through the cellular substance. Our conjectures respecting the situation of the aperture, will be much assisted by the history of the case. If the swelling and inflammation began at the top of the scrotum, near the pubes, it is probable, that the diseased aperture of the urethra is in front of the perinæum; if it began  
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on one side, it is probable, that the opening of the urethra is on that side. Were surgeons fully aware of the nature and urgency of the case, and bold enough to do what is required of them; that is, to cut through the swollen and inflamed parts, till they exposed the tube of the urethra, I am convinced many lives might be saved. If the integuments of the perinæum be affected, it is probable, that the aperture in the urethra is as far, or farther back than that part; yet respecting this point we may err, it frequently happening that the aperture in the urethra is far back, and yet the integuments of the perinæum may contain no urine, the fascia, which I have spoken of, preventing that fluid from affecting them.

I shall briefly relate two more cases to exhibit other varieties of these diseases.

#### CASE.

A gentleman, who was more than seventy years of age, but of a strong constitution, who had never found any difficulty in voiding his urine till a few days before the occurrence, which I am about to relate, and who  
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actually did void it freely in a full stream, after his urethra had given way, so as to allow of the escape of a considerable portion of the urine, was suddenly seized with shivering and severe indisposition. The patient did not complain of any thing being wrong about the scrotum, or urinary organs, till about two days, when he mentioned that his testicles were swollen. When I saw him, the scrotum and integuments of the penis were much distended and mortified on the surface in several large irregular black patches. The distension of the scrotum was not merely occasioned by urine, it was emphysematous also from air extricated by putrefaction. The integuments of the perinæum were scarcely affected. The patient said that the swelling had begun from behind, and on the left side. I concluded, that in this case, the urethra had given way in the perinæum, and that the urine had passed in the course of that canal, between it and the fascia, which I have spoken of, till it arrived at the loose cellular substance of the scrotum which it readily pervaded. I know this to have been the fact in some similar cases

which I examined after death; and I conclude it to be owing to the resistance of a fascia spread beneath the skin, that the integuments of the perinæum are not affected, even though the urethra has given way beneath them. As the object of surgery is to make an external wound opposite to the orifice in the urethra, I pursued a practice in this case which I had found successful in several others of a similar nature, and which I was led to adopt, from discovering that the aperture in the urethra was, in some cases which I examined, much farther back than the part where the urine first appeared to have pervaded the cellular substance of the scrotum. I made a wound about two inches and a half in length, through the integuments and subjacent cellular substance of the perinæum and back part of the scrotum, in the direction of the urethra, but more to the left side. The wound need not extend farther back than the bulb, and should, I think, come forwards so as to divide the integuments of the back part of the scrotum, where the swelling first takes place. The object of this wound is to lay bare the fascia of the perinæum,  
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and the operator may now feel the groove which intervenes between the spongy substance of the urethra and the crus penis. Now, in cases of this description, I have proceeded to divide the fascia, which is spread over these parts, so that I could more distinctly pass my finger into the groove which is formed between them, and gently elevate the fascia from off the spongy substance of the urethra. I did so in the present case, and was anxious that the patient should void his urine, that I might see if it came through the wound which I had made, but he was unable at that time to discharge any. However, afterwards when he made water, it continued to pass freely through the wound in the perinæum.

Having formerly been perplexed with regard to such cases as I have last described, and having now operated in many similar instances, with the same event; that is, with a perfectly free discharge being afforded to the urine which escapes from its natural channel, I thought it might be useful to publish one of them, and I will add another  
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of a different kind, to shew the necessity and propriety of our endeavouring at once to give a free discharge to the urine, by making an external wound, which communicates with the aperture in the urethra.

### CASE.

A gentleman of seventy years of age, was affected with a kind of intermittent fever, for which he was attended by a physician, from whom he concealed that he had any disease of his urethra. After some weeks, however, the patient informed him one morning, that he had a slight swelling of one testis. On this account I was desired to see the patient, who resided a little way from London. The swelling of the scrotum at that time was not larger than a large apple; it was situated at the back part of the bag, and on the right side, and its appearance was very demonstrative of its nature; I urged the patient, but in vain, to permit me to divide the skin, but he said he would allow no operation to be done, unless in consequence of the opinion of other surgeons in consultation.

I found that he had for the greater part of his life been in the frequent habit of passing bougies for himself, and that he was uncertain of his ability to introduce even a very small one. As no consultation could be held on his case, till the following day, I called on the patient in the evening, taking with me an extremely small flexible varnished catheter, hoping that I might be able to pass it, or if I should fail, that I might be allowed to give a free exit to the effused urine. At that time, however, I found the whole scrotum uniformly distended to a very great size, and the integuments of the penis so swollen and projecting, that it was impossible, without an operation, to discover the orifice of the urethra. The patient having appointed other surgeons to attend on the subsequent day, was resolved to abide the result of their opinion, before he would submit to any wound being made. On the ensuing day, several large irregular mortified patches had formed on the integuments of the scrotum and penis, and the patient was so sunk and confused in his intellects, that an operation was, I believe, deemed useless by all present, except myself.



myself. I knew the patient was in other respects healthy, and I had many times seen the whole skin slough off from the genitals, and the patients survive and do well. As, however, an operation was the only resource, it was performed. We drew the patients legs and thighs out of bed, and turning him on his face, the perinæum presented itself in such a manner as to admit of my performing the operation. The integuments of the perinæum were now greatly swollen, which circumstance I had not observed before. I made a wound in the direction of the one made in lithotomy, and cut through between two and three inches of cellular substance œdematous with urine, before I could touch the bulb of the urethra, or other parts situated beneath them. I raised the tumid integuments from off the subjacent parts with my finger, but still no urine flowed. I then endeavoured to pass my finger by the side of the bulb towards the prostate, in the direction of the urethra; and in a few seconds, about three pints (as I should guess) of highly putrid urine, mixed with purulent matter, was suddenly and forcibly projected. Being now  
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assured that the bladder could readily discharge the urine through the external wound, I cleansed and dressed the parts. The patient got into his bed without assistance, and expressed, with vivacity, all that comfort and relief which every one experiences from the evacuation of a much distended bladder. The mortified patches of skin separated, yet sufficient remained to give a covering to the genitals. Great quantities of mortified cellular substance came through the apertures left by separation of the superficial floughs. I was able to introduce a very fine elastic catheter, and by enlarging its size, weekly, the urethra regained its natural calibre in all its parts; so that the patient voided his urine in a larger stream, and with more freedom and force than he had done for fifty preceding years. It seems right however to add, that after two years, the stream having again diminished he had recourse to bougies, and met with opposition from the strictures which had contracted again during that interval.













